# The possibilities for employment creation in agro-related industries and by settlement schemes: the experience of the Sudan

Habtu, Mehretab

*Award date:*
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*Awarding institution:*
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# THE POSSIBILITIES FOR EMPLOYMENT CREATION IN AGRO-RELATED INDUSTRIES AND BY SETTLEMENT SCHEMES THE EXPERIENCE OF THE SUDAN

submitted by MEHRETAB HABTU

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M HABTU





ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

DEDICATED TO

My mother NECCHI

My father HABTU

And my close friends

TZEHAIE and KIROS

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Mehretab Habtu

University of Bath

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## ABSTRACT

The thesis contributes to the empirical literature on the possibilities for employment creation, mainly in agro-related industries in developing countries, by examining the experience of the Sudan.

An attempt has been made to show the magnitude of employment that could be generated in the Sudan industries in particular and the economy in general, assuming Sudan embarks on a programme of improving its (micro and macro) economic management, correcting prices and organising settlement of migrant labour.

The micro-economic empirical survey results of a study of 19 agro-industries in the Sudan suggest that, there is a scope for technological choice in the Sudanese plant; and that the technique actually used in the Sudan tends to be more capital-intensive than would be expected in Sudanese conditions. Results also show variations in unit cost of production and employment creation between plants in the same industry. The economic explanation is that prices are distorted in the Sudan, giving an encouragement to the use of capital intensive techniques. The sources for price distortions are overvalued exchange rates, generous investment allowances and unfavourable economic management. Other LDCs have benefitted in terms of employment creation and increased output by improving economic mangement and correcting prices. Assuming Sudan pursues similar policies, it would invest and expand in ways that reflect the relative scarcity of capital and labour. In the case of the Sudan - avoiding for example, capital intensive production methods and use its abundant labour.

One of the contributions of this study is the finding that Sudan has low capacity utilisation of existing industries. The root

causes of undercapacity utilisation are found to be supply input shortages and price distortions. It is also shown that there is the possibility of improving utilisation of existing industrial capacity, leading to an increase in output and employment creation, firstly by attempting to reduce or eliminate supply input shortages, secondly by correcting prices and thirdly, encouraging shift work patterns.

The study also analysed settlement, another possible employment creation strategy, with the experience of organised settlement of Eritrean refugees. In spite of many weaknesses and problems, there is, we argue, a good prospect for employment creation by means of state sponsored settlement of migrant labour. The problem in the Sudan is not that of an overall labour shortage but of an imbalance between the geographic supply of labour (mainly Western Sudan) and the demand (major economic and development activities are located in Central and Eastern Sudan). One basic theme of aim in this study is the desirability of gradually moving labour closer to capital through voluntary organised settlement of migrant labour.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background to the Thesis

The thesis is concerned with the possibility of employment creation in the agro-related industries of the Sudan and through voluntary organised settlement of Sudanese migrant labour. With this purpose in mind, the core chapters of the thesis investigate and analyse the possibility of applying simultaneously appropriate choice of technology, optimal capacity utilization and choice among various shift-work patterns in the Sudanese agro - firms. In other words, the problems of capacity utilization and alternative shift work patterns are taken into consideration along with searching for appropriate choice of technology in order to promote more employment creation. The survey forming the basis of the micro case studies of choice of technique and optimal utilization of existing industrial capacity in the agro-related industries of the Sudan; and the study of socio-economic activities of organized settlements of Eritrean refugees and seasonal agricultural labourers in the rainfed mechanized farming of the Sudan is based on data collected from firms and refugee households in the Sudan during the field work phase of the research work between January and May 1984.

Let us discuss the reasons why questions about the choice of technique of production come into the debate of

employment creation. Generally, economists think of techniques of production as particular combination of machinery (investment) and labour that can make a certain product. Then, if there is a range of such techniques available each defined by different amounts of investment per worker, the economic problem is to specify the optimal technique assuming that we know the relative cost of capital and labour. The link to employment creation is that if there are unemployed and under employed workers, techniques which use relatively little scarce investment capital per worker (that is, labour intensive one) may become socially desirable or optimal from society's point of view.

The analytical and empirical micro-economic studies of the choice of technique put the main emphasis on investigating and analyzing the range and actual technology in use, productivities (relative efficiency) of labour and capital and unit cost of production and general employment implications of nineteen agro-related firms in the Sudan.

Once plants and equipments have been purchased, capacity has been installed, and it is already operating and that it is possible to vary the number of shifts actually operated; then, the question is asked, is Sudanese existing industrial capacity fully utilized (if not why not?) and what are the causes of low capacity utilization? In such cases, our problems are to identify the main bottlenecks and assess the possibilities for increasing Sudanese industrial employment through the fuller utilization of existing capacity.

The research work also analyses voluntary organized

settlement of Sudanese labour as another possible job creation strategy, taking the experience of organized settlement of Eritrean refugees in the eastern Sudan. Major economic and development activities - Gezire irrigation scheme, the mechanized agricultural sector, and as well as major agro-industries - are located in the central and eastern Sudan. Obviously, central and eastern Sudan attract labour mainly from western Sudan. The labour problem in the Sudan is mainly the imbalance between geographic supply of labour (western Sudan) and its demand (central and eastern Sudan). Hence the proposal is the desirability of gradual moving of labour closer to capital, through organized settlement of Sudanese migrant labour. At the final part of the thesis integrated results of the job creation exercises will be made.

## 1.2 Organization

The thesis comprises five sections. Part 1 (chapter 1 to 5) provides the background to the thesis. After introduction, chapter two discusses the conceptual and analytical difficulties that arise from an attempt to apply concepts, measurements, dimensions of employment, unemployment and underemployment developed in and for developed countries to less-developed countries, and gives a statistical overview of unemployment and underemployment in the urban and rural areas of the Sudan. Chapter three gives a short survey of Sudan economic structure and its development strategy. The

poor economic performance is reflected in a decline in agricultural production, low capacity utilization of existing industries, deficit in the balance of payments and debt crisis. Chapter four provides the structure, the composition, labour force participation rate and trends of the population and labour force of the Sudan. Labour force growth and employment issues is also reviewed. The Sudan high rate of internal migration and emigration to oil rich Arab countries and its effects on the labour market are examined in chapter five.

Part 2 (chapter six) comprises the first original research survey. After examining the experience of organised settlement of Eritrean refugees in the Sudan, the establishment of organized settlement of Sudanese migrant labour as one of job creating strategy is proposed. Part 3 also contains another original research survey. As a general objective of encouraging employment creation chapters 7 to 10 provide results and assessment of an enquiry into the choice of techniques and choice among alternative shift-work patterns in tanneries, textiles, wheat-milling and groundnut decorticator plants in the Sudan.

Part 4 includes chapters 11 to 13. Chapter 12 gives the integrated results of the employment creation exercises, that is, it estimates the magnitude of employment that could be created in the Sudan agro-firms and through organised settlement of Sudanese migrant labour. Chapter 11 provides possible causes for the fall of real wages and sees if there is a relationship between labour

turnover and wages. Chapter 13 gives the summary of the thesis and some proposals.

# CHAPTER TWO

# ISSUES OF EMPLOYMENT UNEMPLOYMENT AND UNDER-EMPLOYMENT IN LDCs

## 2.1 Employment Creation, its Impacts and Approaches

In order to have a clear idea about the relevance of employment creation as a goal to be pursued it is good to understand the reasons why employment generation is regarded as valuable. Perhaps the simplest reason for wanting more employment relates to viewing labour as an important economic resource. Indeed for many developing countries it is the most important of all economic resources. It is common to regard the existence of unemployment as a sign that important economic resources are being wasted. Thus, the objective of employment creation may be related to the goal of a full exploitation of the production potential.

Employment is desirable if additional employment creates more output. This is the output creating impact of employment.[1] Employment creation and the consequential wage payments may also be the only mechanism by which income could be distributed to those who would otherwise remain unemployed. This is the income aspect of employment.[2] Unemployment is demoralising, to feel unwanted, not to be able to make a contribution lowers man's morale and makes him lose his self-respect. Employment in this sense is an end in itself; it gives a person with the opportunity to participate in society and exploit his

sense of worth and dignity.[3] In 1977 about 40 million persons or 5.2 percent of the labour force in developing countries were estimated to be unemployed. A further 291 million or 40 percent of the labour force predominantly in the rural areas and urban informal sector were thought to be under-employed.

If we agree on the importance of considering employment creation as an objective or as a means to an end, then two main alternative approaches to employment creation emerge. The first, the conventional approach, is based on 'labour surplus' model favoured an indirect approach towards development via the modern sector. Growth is emphasised and measured in terms of gross national product (GNP). The modern (formal) sector is an urban based, high capital intensive, high labour productivity and increase in income concentrated among the few, with expanded employment and increased equity anticipated in the long-run. And for these very reasons, its opponents argue, this modern sector has created few jobs and failed to improve the living standard of the ordinary people in less developed countries.[4]

The emerging alternative approach favours a direct method, which without neglecting the modern sector, puts an equal emphasis on the neglected and low productivity sector. This contention is based upon the labour intensive rural and informal sector in the light of relative resource costs and appropriateness of products and draws attention to the need for relevant technologies based on these relative costs and products and the need for rapid spread

of fruits of growth through broad distribution of productivity and income increases throughout the economy.[5]

## 2.2 Conceptual and Analytical Problems of Defining and Measuring Employment, Unemployment and Under-employment in LDCs.

There are serious conceptual problems involved in defining unemployment and under employment in LDCs. Firstly, there is the problem of differentiating between economic and non-economic factors especially in rural areas. For instance, to which category should we allocate work which is generally carried out by unpaid family labour and does not have a market wage rate such as fetching water used domestically, repairing huts, fencing compounds, collecting fuel and threshing.[6] Secondly, there is the problem of defining under employment given the sharp fluctuation in seasonal demand for labour characteristics of many types of occupations in rural areas. And thirdly there is the conceptual problem of measuring remuneration for labour in rural areas. The problem arises from the wide and complex variety of the kind of components of total income, which may include food (cultivated or gathered) non food field and tree crops, fish, livestock and its produce, fuel, water, clothes, doweries and bride wealth.

In developed countries labour force is usually defined as the sum of the number of people employed and unemployed. Employment normally (defined) means working

for an employer for wages, while unemployment is defined as the active seeking for employment. Wage labour as a mode of production developed with industrialization. Measures of unemployment are more appropriate for developed countries, where payments and conditions of employment are generally subject to contractual arrangement and labour legislations, and where social security provides financial support for the unemployed. In such countries, it is relatively easy to divide the labour force into the categories of employed and unemployed. In developing countries, however, a smaller percentage of the labour force is engaged in wage employment (see table 2.1), the majority being self employed or unpaid family workers, and the social security system is correspondingly underdeveloped.[6]

The question of measurement of employment has received little attention in economic theory. Keynes in his general theory treated the measurement of employment as essentially a trivial problem. This may make sense in advanced capitalist economy, since in such an economy it is fairly straightforward to decide whether people are employed or not, thanks to the developed system of wage employment.[7] The concept of employment is vague and ambiguous in any economy in which the wage system is weak and in which self-employment and unpaid family labour are common.[8] Indeed, for an economy of peasants and artisans the concept of employment loses its straightforward meaning and economic activities merge into a wider complex of family based activities. The criterion of being paid

a wage does not apply and that of productivity is difficult to use since it is not easy to separate out the productive contribution of any particular member family into the total family enterprises.[9]

Table 2.1 Percentage of the labour force in wage employment in selected countries.

| Industrialised countries | | Middle income countries | | Low income countries | |
|---|---|---|---|---|---|
| Sweden | 91 | Egypt | 54 | Sudan | 25 |
| USA | 90 | Greece | 42 | Tanzania | 9 |
| UK | 88 | Yugoslavia | 50 | India | 17 |
| W. Germany | 83 | Peru | 47 | Pakistan | 22 |

Source: ILO Yearbook of Labour Statistics 1980 and 1981

There are broadly two schools of thought as to the ways measurement of employment problem in developing countries has to be approached. The first school contends that a somewhat more hopeful approach in the long term to measuring the size of the employment problem and the degree of progress towards its solution, is "we believe offered by an emphasis on poverty", and that the openly unemployed are only "the tip of the iceberg".[10] The emphasis here is clearly on invisible underemployment. In other words, the extent of underemployment as measured by an income criteria becomes an important part of the overall employment problem. The second school of thought

argues that "it is important to maintain analytical distinction between a problem of poverty, which may indeed be reflected in low labour earnings, and the problem in the labour market, which may be indicated by open unemployment or sectorial differences in labour marginal product".[11] In other words, estimates of unemployment and inter-sectorial differences in productivity are taken to be an indication of market imperfections and the estimates of underemployment are interpreted as measures of poverty.

The rate of growth of labour force depends upon the rate of growth of the population of working age and upon participation rate. But distinction between members of the labour force and dependents is not at all clear in most parts of developing countries. This is particularly true in many rural areas where men, women and children above a fairly young age may all devote a part of their time to productive activities. And in urban areas they (children) also carry certain kinds of work out at least sporadically. The number of people wanting work varies with the amount of work available, often 'discouraged workers' who do not bother to look for work when they think there is no chance of finding any start to do so if the chance improves.[12]

Surveys designed to distinguish between those actively searching for jobs and those willing to accept jobs at going wage rates but not actively looking suggests that the conventional approach fails to capture all those unemployed in the sense of being in excess supply. Turnham (1971) for instance gave an example of West Malaysia in 1967, where

unemployment rate was increased from 6.8 to 8.8 per cent by the inclusion of discouraged workers. In the study of Tanzanian urban labour market in 1971, Sabot (1977) shows that the inclusion of discouraged workers increases the rate of urban unemployment from 8.0 to 12.0 per cent.[13]

Several countries have recently conducted sample surveys in urban areas to identify the degree of 'involuntary unemployment'. The figures for the total urban labour force range from between 2 to 3 per cent to over 20 per cent; and the corresponding figures for the younger members of the labour force alone are commonly twice as high. In the study of unemployment Turnham warns that, among other things, the labour force is often defined in such a way as to exclude many of the totally unemployed, people finally discouraged from even seeking work,[14] for example, the surveys have tended to ignore unemployment in household enterprises and people working for as little as one day per week or month are commonly recorded as employed.

The statistical measurement of unemployment is sometimes extended to allow for those who are working but would like to work longer hours at the going wage rate. Those so identified are usually referred to as the visibly unemployed. But in developing countries, many people attending their place of work for a full number of hours may still be said to be invisibly underemployed, either if they are idle for much of the time, or if though they are continuously occupied, the product of their activity is unacceptably low.[15]

Lewis (1954) attention was directed primarily towards the agricultural sector and the measurement of 'surplus labour', the quantity of labour that can be withdrawn from the agricultural sector without reducing agricultural output. With the emergence of a large low productivity (informal) sector in most major cities, attention switched to urban areas and from measure of labour utilisation to measure of income or productivity. Those below some specified level of income or productivity were described as invisibly underemployed.[16]

Above we discussed the conceptual, theoretical and analytical difficulties that one faces in defining and measuring employment, unemployment and underemployment in LDCs. The main cause for the problem is that in many LDCs the wage system is very small and the majority of labour are engaged in self-employment and unpaid family labour. The following section estimates and examines, unemployment and underemployment taking the example of the Sudan.

## 2.3 Estimate of Unemployment and Underemployment in the Sudan

Several surveys have attempted to measure open unemployment in the Khartoum area as can be shown in table 2.2. We can see from the same table that open unemployment in Khartoum is about 5.5 percent.

Table 2.2 Rates of open unemployment in Khartoum

| Survey | Period | Percentage unemployed |
|---|---|---|
| Population & housing | 1964 | 5.0 |
| Migration survey | 1971 | 5.6 |
| Population census | 1973 | 5.0 |
| MEFIT survey | 1974 | 6.5 |
| CESM survey | 1974 | 5.3 |

Source: ILO Growth, Employment Sudan 1976 p. 313

The CESM survey was partly designed to test whether a low and seemingly constant rate of open unemployment in Khartoum hides a lot of underemployment. The result is given in table 2.3. Apparently, about the same numbers of people are affected by underemployment of some sort as are affected by open unemployment.[17]

The standard explanations for urban unemployment is that the rates of increases of demand for labour are insufficient in relation to increases in the supply because capital requirements per unit of output are inelastic and because capital accumulation does not proceed fast enough. Solutions, then, involve some combination of faster capital accumulation and growth, and reducing the rigidity of the capital-output ratio.[18]

A different interpretation of the unemployment problem begins with the assumption that some work is

always available in the traditional sector and that additional numbers can be accommodated there partly through work-sharing and partly through accepting lower income for a given effort. The question to focus on therefore, according to this argument, is the reason why some groups tolerate open unemployment in preference to traditional sector low productivity work.

Table 2.3 Categories of underemployment

| Category | Numbers | Percentage of Labour force |
|---|---|---|
| Working for less than 35 hours a week | 6650 | 3.1 |
| Not at work but usually working full time | 3650 | 1.7 |
| Not at work, usually working far less than 35 hours | 900 | 0.4 |
| Not working, actively looking for work (active, unemployed) | 11300 | 5.3 |
| Not working, not looking for work but wanting work (passive unemployed) | 1250 | 0.6 |

Source: ILO Growth, Employment and Equity 1976 p. 314

Having regard either to past trends in wage increases in 'modern' sector employment or to current wage differentials between these employments and those available in the traditional sector, the decision of a school-leaver to spend time looking for the 'right' job is in many

2.1 Sudan


A.G. EGYPT
LIBYA
RED SEA
RED SEA PORT SUDAN
NORTHERN
Dongola
NILE
Atbara
CHAD
NORTHERN DARFUR
KHARTOUM
Kassala.
El Fasher
NORTHERN KORDOFAN
El Obeid
EL GEZIRA
Wad Medani
WHITE NILE
BLUE NILE
El Gedarif
El Roseires
Nyala
SOUTHERN DARFUR
SOUTHERN KORDOFAN
Kadugli
ETHIOPIA
Awiel
UPPER NILE
Malakal
BAHR EL GHAZAL
Fangak
JUNGLEI
EL BUHEYRAT
CENTAL AFRICAN REPUBLIC
WESTERN EQUATORIA
Maridi
Juba
EASTERN EQUATORIA
ZAIRE
KENYA
UGANDA
Scale 1 : 8 000 000

countries a perfectly sensible one from a private benefit point of view. It may also be rational for parents or others to maintain the school leaver during the process in the hope of later 'pay off'.[19] This argument is more closely related to the special characteristics of the structure of open unemployment; the importance of young and relatively well educated people, and of persons of dependent status.

In the Sudan a breakdown of open unemployment by age groups shows that unemployment is heavily concentrated among the young; around 60 percent of all unemployed are below 25 years of age, many of them looking for the first job. Rates of open unemployment decline from 22.6 percent for 15-19 year olds and 10.4 percent for 20-24 years to a low of 2.7 percent for those in the 45-49 age group.[20]

The provisional results of the popoulation census held in April 1973 in the Sudan yield a country-wide unemployment figure of 6.5 percent. A breakdown between urban and rural areas gives figures of 5.7 percent and 6.7 percent respectively. Only one percent of women are recorded as unemployed as against 7.8 percent for men. The 1967/68 household survey, while using comparable definitions of the population, does not appear to use any age limits. It comes up with an overall rate of unemployment of 2.9 percent, ranging from 1.5 percent for rural areas to 7.5 percent for semi-urban and 9.6 percent for urban areas. Female unemployment rates are higher than those for males. It is contended that the variations

in the results of census and surveys were mainly due to difference in concepts, and differences in coverage and in age limits.[21]

Table 2.4 Rates of unemployment provincially

| Province | Percentage | Location |
|---|---|---|
| Khartoum | 5.9% | North |
| Darfur | 2.2% | North |
| Blue Nile | 5.7% | North |
| Equateria | 9.5% | South |
| Bahal Ghazal | 17.7% | South |

Source: From 1973 population census

As it is shown in table 2.4 in the Sudan the country wide average unemployment figure is 6.5 percent. But the average unemployment figure for the two provinces (Equateria and Bahal Ghazal) in Southern Sudan is as high as 13.6 percent, according to the census of 1973.

Table 2.5 based on a survey and census of four African countries, shows that Morocco, Tanzania and Cameroon have a lower level of open unemployment in rural areas than is found for urban areas. But in the Sudan case, taking the 1973 census data, average unemployment in rural areas is 6.7 percent and in urban areas is 5.7 percent.

Table 2.5 A comparison of urban and rural rates of unemployment in Africa

| Countries | Year | Urban rates | Rural rates |
|---|---|---|---|
| Cameroon | 1964 survey | 4.6 | 3.4 |
| Sudan | 1973 census | 5.7 | 6.7 |
| Tanzania | 1965 survey | 7.0 | 3.9 |
| Morocco | 1960 census | 20.5 | 5.4 |

Source: Turnham (1971) table 111.7 and Sudanese census (1973)

Evidence concerning unemployment derives mostly from registered unemployment, and in less developed countries this represents no more than the 'tip of the iceberg' of unemployment and underemployment. We can say that the statistics understate the magnitude of the problem.[22] In fact, whatever the statistical rate of unemployment may be, the concept does not mean a lot especially in the rural area of the Sudan, where above 80 percent of the population derive their earnings from agriculture and related activities. There, the majority of those engaged in agriculture and related activities are underemployed, whether in terms of hours or days worked during the slack season, or in terms of low productivity during the peak season.[23]

The above contention of high underemployment of labour in the rural areas of the Sudan was confirmed by a recent field work study of rural labour in northern

Sudan which came with the finding that labour utilization rate in the agricultural sector was 54.2% in 1981 and that more than two thirds of the agricultural labour force were not utilized in the months of January, Feburary, March, April and September in 1981.[24]

## 2.4 Summary and Conclusion

Chapter two gives the main reasons for employment creation and identifies two approaches to employment creation. The chapter continues examining the conceptual, theoretical and analytical difficulties that one faces in defining and measuring employment, unemployment and underemployment in LDCs. There is the problem of differentiating between economic and non-economic factors especially in rural areas. There is also the problem of defining underemployment given the sharp fluctuations in seasonal demand for labour characteristic of many types of occupations in rural areas. Furthermore, there is the conceptual problem of measuring remuneration for labour in rural areas.

We saw that one of the main causes for the above mentioned problem is that in many LDCs a small percentage of labour force are engaged in wage employment and the majority are being self-employed and unpaid family labour. In other words, economic activities merge into a wider complex of family based activities. The criteria of being paid wages does not apply and that productivity is difficult to use since it is not easy to separate out the productive

contribution of any particular family member from the total family based activities.

The same difficulties of estimating unemployment and underemployment is also examined in this chapter taking the example of the Sudan. Taking the 1973 census data, average unemployment in rural areas was 6.7 percent, and in urban areas is 5.7 percent. Country wide unemployment figure is 6.5 percent, but unemployment is higher in the south (13.6%) and unemployment is concentrated among the young. But, whatever the statistical rate of registered unemployment and underemployment might be, the concept does not mean a lot especially in the rural areas of the Sudan where the vast majority of the people are engaged in agriculture and related activities and are underemployed. Obviously, censuses and surveys understate the nature and the magnitude of the problem. The next chapter gives a brief survey of the Sudan economic structure and its development strategy.

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# CHAPTER THREE

# STRUCTURE OF THE ECONOMY AND DEVLOPMENT STRATEGY IN THE SUDAN

## 3.1 Economic Structure

Sudan is located in the North-Eastern corner of Africa. As the largest country in Africa, Sudan covers some 2.5 million square kilometres, of which about one-third is considered suitable for agricultural uses. The country's arable land potential has been estimated at 200 million acres of which only 17 million are currently cultivated. Irrigation covers 4 million acres while the rest is under rainfed cultivation. The sixty million acres of existing pasture land are partially utilized by traditional herdsmen in the western, eastern and southern parts of the country. Table 3.1 shows that the total arable and pastoral land reaches up to 174.5 million feddans, representing nearly 30 percent of the total area of the country. Sudan has also great wealth of animal resources comprising millions of heads of cattle, sheep, goats and camels owned by nomads. In 1982 the population of Sudan was estimated about 20.5 millions with an annual growth rate of 2.8% and a density of about 8.6 persons per square kilometer. About 71% of the population live in rural areas, 18% in urban and semi-urban and the remaining 11% are nomadic. At the 1973 census about 47% of the population were under 15 years of age. The population is concentrated in Khartoum province and the Central Regions where population densities were

respectively 55 and 28 per square kilometre in 1973 compared with 4-7 per square kilometre elsewhere. The majority of the country's agricultural and industrial activities are also located in Khartoum province and the Central Regions.

Table 3.1 Size and Quality of Land

| Quality of Land | Area in Million of Feddans | Percentage |
|---|---|---|
| Arable land | 117.4 | 19.7 |
| Pastoral land | 57.1 | 9.6 |
| Desert and poor land | 214.2 | 35.9 |
| Forests and Jungles | 207.9 | 34.8 |
| | | 100.0 |

Source: Ministry of Economic Planning (1983) Rural Labour Study in Northern Sudan., p. 10.

Sudan is categorized as one of the least developed countries of the world with a per capita income of US$ 440 per annum (World Bank estimate 1983). Agriculture is the major economic sector in the Sudan. As can be seen from table 3.2 the agricultural sector percentage share of GDP amounts to 37 percent. About 80 percent of the country's population depend for their livelihood on agriculture and related activities. Furthermore, about 95% of foreign currency earnings are realized from the export of agricultural activities. The importance of the different productive

sectors of the economy of the Sudan can clearly be seen in table 3.2 which shows the sectoral distribution of the gross domestic production (GDP) of the country in 1981/82 which totalled £S. 6218 million (in current prices). From this table it is obvious that the dominant sector is agriculture while the commerce and hotels ranks the second and manufacturing comes fifth.

Table 3.2 Sectoral Distribution of GDP 1981/82

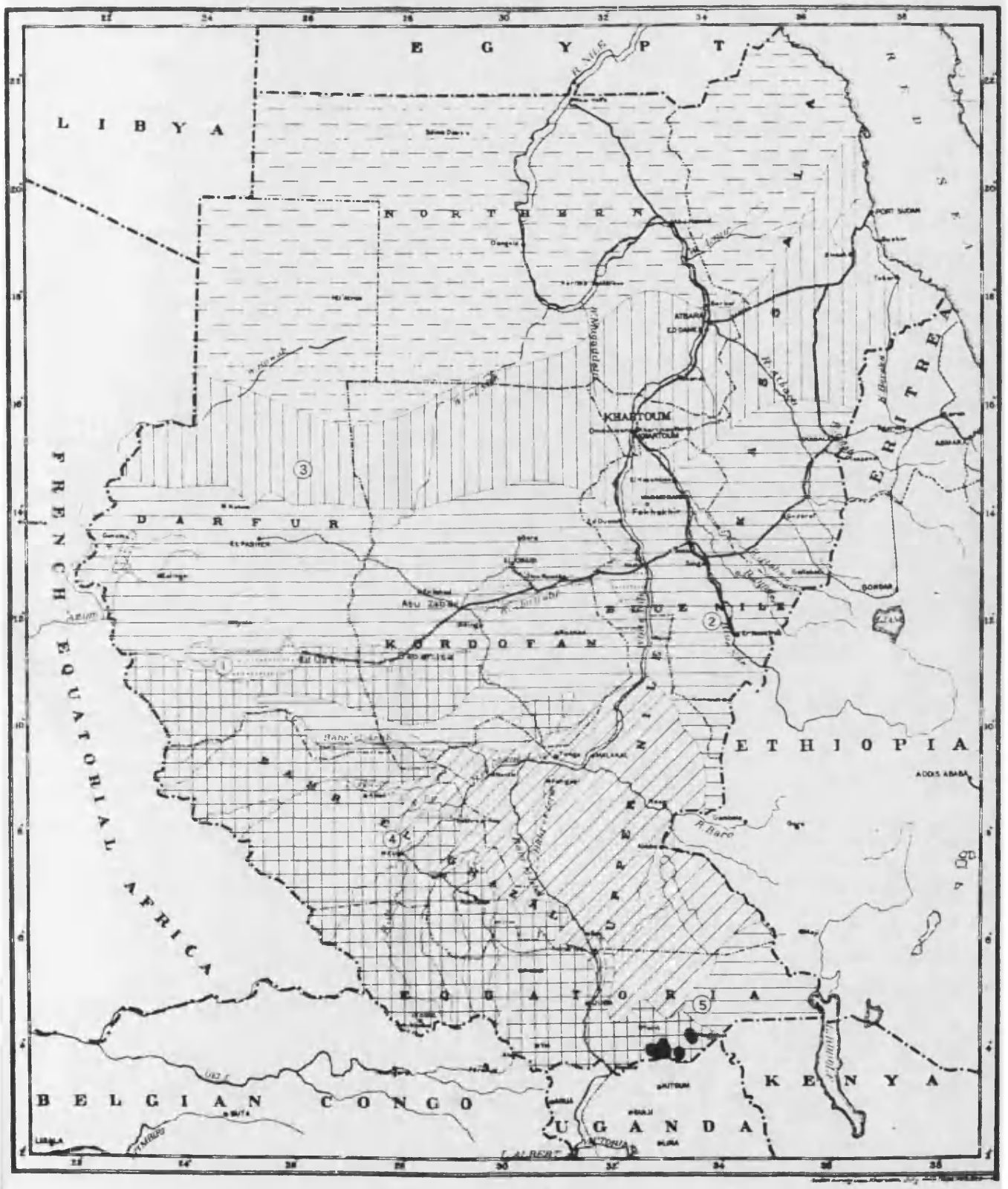
| Sector | Sector's share £s (millions) | Sector's percentage share % |
|---|---|---|
| Agriculture and livestock | 2315 | 37.2 |
| Manufacturing | 370 | 6.0 |
| Mining | 10 | 0.2 |
| Electricity and water | 130 | 2.1 |
| Construction | 326 | 5.2 |
| Commerce and Hotels | 1153 | 18.5 |
| Transport and Communication | 658 | 10.6 |
| Financial services and real estates | 367 | 5.9 |
| Personal and Household services | 155 | 2.5 |
| Government services | 734 | 11.8 |
| | 6218 | 100.0 |

Source: Ministry of Finance and Economic Planning, Prospects Programmes and Policies for Economic Development 1982/83 - 1984/84 Oct. 1982 p. 4.

3.1 ECOLOGICAL MAP SHOWING MAJOR VEGETATION AND GRAZING ZONES

OF

# SUDAN




Scale 1 : 8000 000

KEY

Desert

Acacia–desert scrub

Acacia–grass savannah
Baggara catena (subdivision of acacia–grass savannah)

Swamp

Woodland–grass savannah

REFERENCE

Boundaries, International
Provincial
Railways
Telegraph Lines
Roads, All Season
Dry Season
Aerodromes (regularly visited)

SUGGESTED LOCATIONS OF GRASSLAND EXPERIMENTAL CENTRES

(1) Baggara catena centre

(2) Central rainlands centre

(3) Acacia–desert scrub centre

(4) Bahr el Ghazal centre

The agricultural sector in the Sudan consists of two distinct parts. The first is the irrigated areas concentrated mainly in the publicly administered schemes along the banks of the Nile and its tributaries, e.g. the Gezira scheme, Managil extension and Rahad scheme. In the Gezira scheme and Managil extension there are about two million feddans of irrigated land while in the Rahad scheme there is one million feddans. Cotton, the country's main cash crop, is cultivated in these ares. The second component is the rainfed areas which are mostly farmed by traditional methods. These also include the mechanized rainfed farming sector which has become of growing importance.

Public and private investment has been heavily concentrated in the modern sector of the irrigated areas and in rainfed mechanized farms in the east-central region where the production of groundnuts, wheat and sugar cane have been added to cotton and sorghum (dura). The traditional sector with no public investment, has contributed to the production of livestock, groundnuts, sesame and gum arabic.

The backbone of Sudanese agriculture is cotton which together with groundnuts, sesame and gum arabic represents the bulk of the export basket. Cotton's share of exports normally varies between 50% to 70%, but disastrous seasons in 1980 and 1981 reduced it to under 25%. This fall was parallelled in cotton revenue which fell from £S. 151 million in 1979 to £S. 127 million in 1980 and £S. 70 million in 1981. This bad performance was partly due to competition from

synthetic fibres but in particular it was a result of government policy (of reducing the area under cotton in the Gezira by about one-third) in the mid-1970 of implementation of a programme of diversification which was intended to reduce dependence on cotton as a sole foreign exchange earner and increase the contribution of wheat, groundnuts and sesame to export earnings.

The industrial sector in Sudan, for the moment, remains a comparatively small part of the economy. It produces primarily import-substitutes for consumer goods and uses imported machinery, equipment and both local and imported raw materials. The most important industries in this sector are textiles, leather, cement and food processing industries. Among the latter, the most important are the sugar, flour and edible oils industries.

In the Sudan the transport sector and power facilities are highly underdeveloped and constitute major constraints in the effective development of the country. Until recently railways have been the only effective mode of transport. It is estimated that about two thirds of long distance freight transport and perhaps one half of all passenger transport are carried by railways. River transport is important as a means of communications between the southern and central parts of the country, but it is small in relation to the total. However, it has a great potential because of the availability of navigable rivers. Road transport started to receive more attention by the early 1970s, when the construction of paved roads linking the country's only port, port Sudan, with Khartoum and

other points of production and consumption in the country was planned.

Table 3.3 Distribution of Labour Force among the productive sectors (1976/77)

| Sector | Number of labour per sector | Percentage of employment per sector |
|---|---|---|
| Agriculture and Forestry | 4120971 | 68.5 |
| Industry and Mining | 270720 | 4.5 |
| Electricity and Water | 54144 | 0.8 |
| Construction and Building | 108288 | 1.8 |
| Trade and Finance | 294784 | 4.9 |
| Transport and Communication | 204544 | 3.4 |
| Services | 625665 | 10.4 |
| Others | 336896 | 5.6 |
| | 6016017 | 100.0 |

Source: The Six Year Plan (1977/78 - 82/83) Op. Cit., p. 95.

The estimated econmically active population of the Sudan is about six million. The absolute and relative distribution of manpower among the different sectors of the economy in 1976/77 is shown in table 3.3. In this table it is indicated that the majority of the manpower resources are engaged in the agriculture and forestry sector. They

constituted 68.5 percent of the total labour force in 1976/77. Obviously, one can easily see the important role of the agricultural sector in the Sudanese economy and its absorptive capacity of labour force. Second in importance to the agricultural sector, with regards to the size of the labour force, is the service sector. It's contribution reached 10.4 percent of the total labour force in 1976/77. The same table shows also the importance of the industry and mining sector from the point of view of its share in manpower which reached 4.5 percent in 1976/77.

The pattern of development and the magnitude of the current Sudanese economy are reflected in the macro indicators of table 3.4. Imports, particularly in recent years, have risen relative to GDP, while exports have fallen sharply, leaving a deficit on current account equal to around 12 percent of GDP. Current account deficit in 1983 was 1022 million. Public debt outstanding and disbursed has grown to over US$ 3 billion or about four times export earnings. In 1985 Sudan's total foreign debt was more than 9 billion and the projected debt service ratio for 1984/85 was as high as 70 percent of export earnings. Debt-service obligation has been estimated at more than US$ 830 million per year in both 1984 and 1985. In fact, the external debt burden is now one of the key economic constraints.

Rapid and accellerating inflation in the Sudan (inflation in 1985 was 45%) undermines allocative efficiency because it increases uncertainty and induces savers to invest in unproductive inflation hedges, such as real

estate, consumer durables gems and foreign currency deposits. This is exactly what is happening in the Sudan, textiles and tanning are either declining or stagnating while others mainly property deal estates, foreign currency deposits, hotels and restaurants face a boom situation.

The Sudan has an unusually high rate of internal migration estimated at about one million persons per year and 80% of them are rural-rural migrants. Emigration to the Arab oil states is a new phenomenon in the Sudan date principally from the middle of the 1970s, but has progressed at a very high rate. The official estimate of migrant Sudanese is about half a million of both skilled and unskilled labour. But it is widely accepted that official emigration estimate forms only a minor proportion of the total number of emigrant labourers. On the positive side emigration has helped to relieve the pressure of absolute and disguised unemployment domestically. On the negative side emigration has caused a serious loss of trained manpower that could have made important contribution to Sudan's growth and economic recovery.

There are two foreign exchange rates, which is pegged to the dollar and covers essential commodity imports and the free market rate which covers others and non-essential goods. In 1978 the official Sudanese (£S Sud 1.00) pound was devalued from US$ 2.87 to US$2.50; and since then the Sudanese pound was devalued five times. The free market rate which is operated in exchange offices in commercial banks was devalued by 17 percent to US$ 1 =

Table 3.4 SUDAN: Summary of Macro Indicators

| Item | 1970/71 | 1972/73 | 1977/78 | 1980/81 |
|---|---|---|---|---|
| | | - (LS millions) - | | |
| GDP (current prices) | 761 | 897 | 2883 | 4435 |
| | | - (US$ millions)- | | |
| Current Account Balance | -44 | -11 | -471 | -719 |
| External Public Debt (Disbursed only) | 300 | 370 | 1800 | 3100 |
| Debt Service Ratio (%) | 14 | 12 | 35 | 40 |
| Cotton Exports (ths bales) | 1500 | 1200 | 800 | 400 |
| | | - (percent of GDP) - | | |
| Imports | 18 | 17 | 16 | 21 |
| Exports | 16 | 17 | 8 | 9 |
| Current Account Balance | -2 | - | -8 | -12 |
| Current Revenues | 22 | 20 | 16 | 17 |
| Current Expenditures | 18 | 18 | 15 | 20 |
| Current Savings | 4 | 2 | 1 | -3 |
| Development Expenditures | 2 | 3 | 6 | 7 |
| | | - (Growth rates) - | | |
| | 70/71-80/81 | 70/71-72/73 | 72/73-77/78 | 77/78-80/81 |
| | 2.6 | -5.2 | 7.9 | -0.7 |

Source: IBRD (1982), Sudan: Planning for Stabilisation and Change, Washington D.C. p. 15

£ Sud 2.10 in October 1984 whilst the official rate was devalued by 48 percent to US$ 1 = £ Sud 2.50 in February 1985 after a great deal of pressure from the IMF, increasing precarious foreign exchange position and increasing debt.

Real wages in the agro-industrial sector of the Sudan in the 1970s and 1980s remained either constant or falling. This is partly attributed to the high rate of inflation and to the increasing pressures on the viability of particular economic activities. Tenant farmers producing cotton, as well as urban and semi-urban employers in textiles, leather, wheat milling, oil-seeds processing and others face the problem of declining profitability; the result is high capacity under utilisation making losses, and employers cannot be expected to pay proper salaries in this situation. The decline in export market for cotton and the consequent slump in its price have formed a major part of the difficulties in domestic raw cotton production, thus effecting the profitability of tenant cultivation in the irrigated schemes.

While the above brief survey of the nature of the Sudan economy shows its growth potential and weakness, a worsening economic situation since 1978 has by and large, prevented the economy from achieving its potential growth. Decline in agricultural production caused, in the main, by lack of production incentives and mismanagement, has aggravated the strained balance of payments situation; and low capacity utilization of existing industries caused, mainly, by supply input shortages and also the

debt crisis, all greatly contributed to the deterioration of the stagnating economy of the Sudan.

## 3.2 Development Strategy

The Economic structure of the Sudan is obviously influenced by the development strategies that was pursued by the Sudan. And since this thesis is concerned with employment creation mainly in the agro-related industries of the Sudan; we briefly look whether 25 years of Sudanese development strategies emphasised the relief of perceived scarcities or the utilization of obvious surpluses.

In the Sudan development strategy, the emphasis was on growth of output of the modern industrial and agricultural sectors. Employment objective was taken as peripheral and a by-product of economic growth. For example, the five year plan of (1971-75) later on extended for a period of two years postulated a growth target of 7.6 percent per annum.[1] The plan was not meeting its objectives.

The development strategy which many developing countries adhered to has been one which emphasised raising per capita income as a primary target. The implication has always been that achieving maximum rates of growth in output would eventually increase employment. However, evidence from the developing countries does not substantiate this argument. In fact, while most of these countries managed with varying degrees of difficulties to achieve impressive rates of growth in their domestic product, more and more people are finding it difficult to obtain a job.

In other words, economic growth has not averted the unemployment and underemployment problems of developing countries.[2]

In the Sudan agriculture as an economic sector and farming as an occupation are both shown to account for 78 percent of the total population employment, the industry sector accounts for 10 percent and 12 percent of the employment in the service sector. This being the sectoral distribution of the labour force, in the Sudan development strategy emphasised raising per capita income as a primary objective. Implicitly, it means concentration on the development of modern irrigated and mechanised agricultural and industrial sector at the complete negligence of the traditional (small farmer) agriculture and nomadic population. In agriculture this was done through the expansion of mechanised farm land and development of more irrigated schemes and rehabilitation of the existing ones.

Industrialization strategy in the Sudan is based on import-substitution. This is generally carried out behind high customs barriers to lay the foundations of industry. It has subsidized imports of equipments and the establishment of factories. This development strategy of industrialization ignores the comparative advantage possessed by the Sudan, its unemployed and underemployed labour. On the contrary development strategy promoted capital intensive technology at the expense of labour intensive technique by creating distortions in the price of factor of production, the

result is the situation of extensive underemployment and unemployment accompanied by industiral over-equipment.

Agricultural production in the traditional sector received very little government support with the western and southern regions of the country in particular deprived not only of agricultural investment but also physical infrastructure (transport, power) industry and social services. For instance, the Six Year Plan (1977/78 - 1982/83) states that a major objective is the "development and modernization of the traditional agricultural sector",[3] and yet little of the £S 715 million allocated to the agricultural sector in the plan period has been ear marked for the traditional sector. The only operational projects are the Sag El Naam project (£S 2.1 million) and an agricultural development project in the Nuba mountains area (£S 6.7 million).[4]

No employment creation targets was included in either (1961-71) ten year plan or the five year plan of (1971-75). Hence, it is not possible to discuss employment creation targets in the two previous plans having been reached or not because employment creation considerations were neither seriously considered nor integrated into any of these planning excercises. And little attention was paid to the country's employment problems.

The Six Year Plan of (1977/77 - 1982/83) differs in its objectives (at least on paper) from the previous two plans. Not only does it aim at growth in output, but it also aims at the development and modernization of the traditional sector, expanding productive employment

opportunities and limiting unemployment as a first step towards its eradication. Employment targets were set up for the first time in the history of Sudanese development strategy.

The Six Year Plan of (1977/78 - 1982/83) which was equally ambitious in its objectives (annual average growth rate target of the plan was 7.5 percent) was barely underway before the economy began to experience the serious problems which still beset it. In 1978 the plan was tacitly suspended and replaced by a series of short term 'rolling' programmes which were designed to restore some balance to the economy with a particular emphasis on the expansion of exports. Central emphasis was the rehabilitiation of existing production units and the removal of transport and energy bottle necks.

Sudan development strategy emphasised raising per capita income as the central objective. Other objectives such as employment creation, and equity are thought to be by-products of the general economic growth. In other words, development plans and strategy concentrated on the development of both industrial and modern irrigated and mechanised agricultural sector to the complete neglect of the traditional agricultural and informal sector. Hence, we have now established that the Sudanese development strategy have emphasised the relief of perceived scarcities (capital) and not the utilization of obvious surplus (labour).

In this chapter we discussed briefly the character of the economic structure of the Sudan; and was followed

by an assessment of Sudanese development strategy. The next chapter deals with the population and labour force in the Sudan.

Footnotes to Chapter Three

1. Ministry of National Planning: The Five Year Plan of Economic and Social Development 1970/71 - 1974/75 Vol. 1 p. 25.

2. D. Turnham: Employment Problems in Less-Developed Countries (Paris, OECD, 1971) p. 12.

3. Ministry of National Planning: The Six Year Plan of Economic and Social Development 1977/78 - 1981/82 Vol 1. p. 31.

4. Ibid., Vol. 2 p. 23.

# CHAPTER FOUR

# POPULATION LABOUR FORCE AND EMPLOYMENT ISSUES

## 4.1 Introduction

This chapter provides a detailed examination of the size, age-sex structure, composition, labour force participation rate and trends of the population and labour force of the Sudan. After an introduction, with a brief look at the consequences of rapid population growth in Sub-Sahara Africa, the outline of this chapter will be as follows; firstly, discussion of the population situation in the Sudan and it includes (a) population growth between 1955/56 and 1973/74 census, (b) composition by sex and age structure, (c) fertility levels and trends and (d) the nomadic population. Secondly, we examine labour force size, age-sex structure and labour force participation rate. Thirdly, we look at the labour force growth and its accomodation.

Africa is witnessing a rapid population growth, for example in the next decades Africa's population will continue to grow by 3 percent.[1] In fact, it increased by an average of 2.7 percent annually in 1970-79 as it is shown in table 4.1. Throughout the 19th century annual population growth was only 0.8 percent in developed countries compared with 2.4 percent in less-developed

countries for 1950-70.

Table 4.1 Average Annual Growth of Population of Selected African Countries

| Country | 1960-79 | 1970-79 | Population in 1980 (in millions) |
|---|---|---|---|
| Ethiopia | 2.4 | 2.1 | 31 |
| Sudan | 2.2 | 2.6 | 18 |
| Tanzania | 2.7 | 3.4 | 19 |
| Kenya | 3.2 | 3.4 | 16 |

Source: World Bank Accelerated Development in Sub Sahara Africa 1981 p. 176.

Rapidly expanding population has greatly complicated the inherently difficult task of securing rapid economic progress in Africa. The growth of per capita income can be broken into three parts; (1) population growth rate (2) investment/income ratio and (3) additional income per unit of investment. Per capita GDP in Sub-Saharan Africa grew by an average of 1.4 percent per year in the 1960s but it decelerated to 0.4 percent during 1970-81. Of this deceleration about half was accounted for by an increase in the population rate.[2]

Rapid population growth and a youthful age structure in Sub-Saharan Africa can also be expected to have at least two economic consequences. First, there is a high child

dependency ratio. Most governments in Sub-Saharan Africa have found it increasingly difficult to cope with the demands for schools, health facilities, housing and other social services, while some have to cope with periodic famine in the situation where rural people depend almost entirely on rainfed agriculture. Second, the new entrants to the labour market will outnumber those in the older age.[3] In other words, rapid population growth is adding to the labour supply at much faster rate than can effectively be absorbed in employment by the economy.

At any given time the labour force supply is determined by the size and age-sex structure or the population on the one hand, and the age-sex-specific activity rates (the percentage of male or female population in a given age group working or looking for work) on the other. It is easy to visualize that two countries will have significantly different labour supply with identical population size and specific-activity schedule but different age structure or with identical population size and age structure but different activity schedule.

## 4.2 Population of the Sudan

### 4.2.1 Population Growth of the Sudan between 1955/56 and 1973/74 census and after 1973 census

The first modern population census in the Sudan was carried out in 1955/56, it estimated total population to be 10.3 million. The second census was carried out in

1973, provisional estimates indicate that the total population in 1973 was 14.7 million. For the country as a whole the rate of growth of population for the intervening 17 year period was therefore, 2.2 percent annually, made up of a growth rate in urban areas of 7.4% and in rural areas of 1.5%.

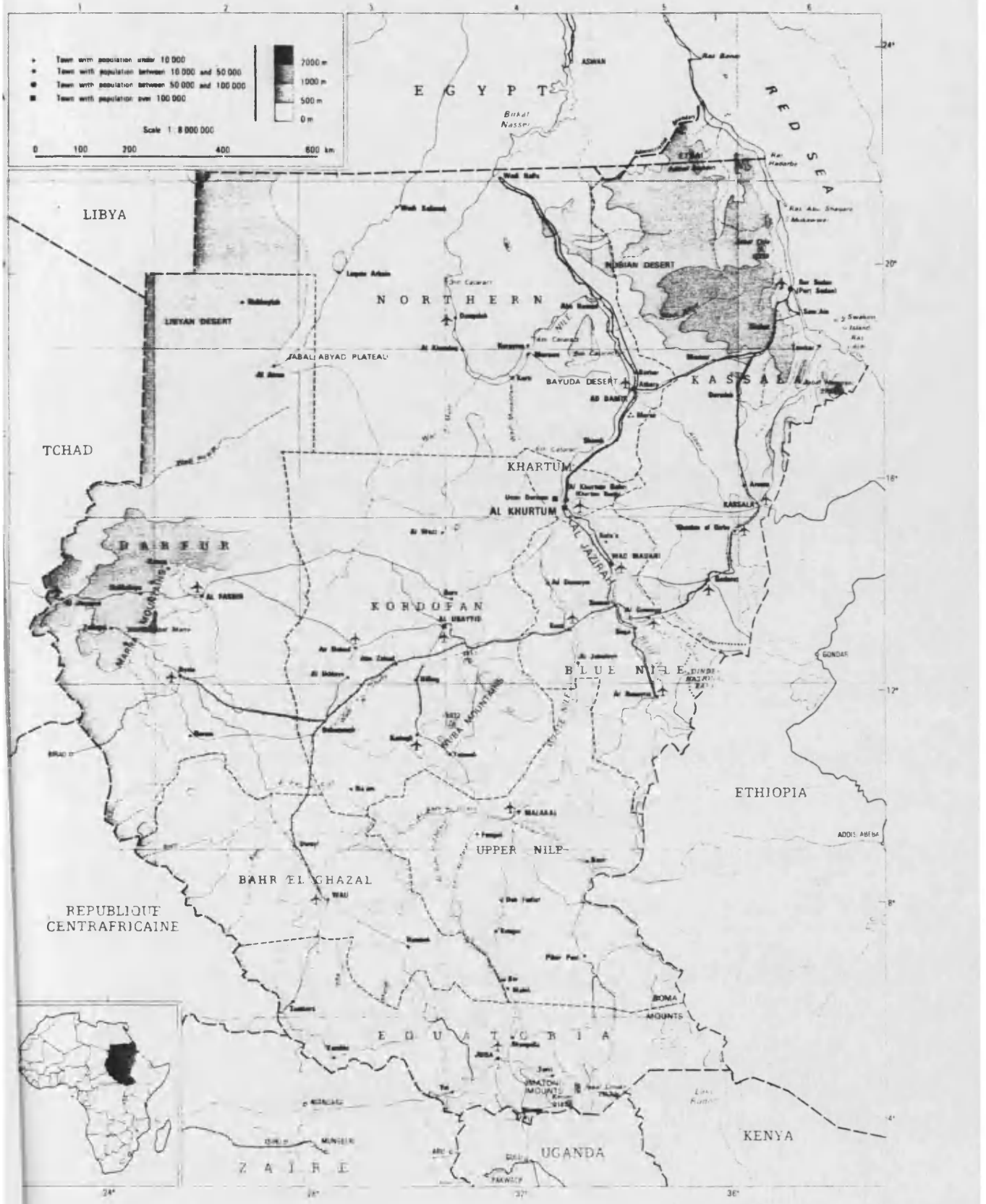
Table 4.2 Population Growth by Province

(1955-1973)

| Province | 1955/56 | 1973 | Annual Growth Rate |
|---|---|---|---|
| Darfur | 1328765 | 2139615 | 2.7 |
| Kordofan | 1761968 | 2202345 | 1.3 |
| Khartoum | 504923 | 1145921 | 4.7 |
| Blue Nile | 2069646 | 3740405 | 3.2 |
| Kassala | 941039 | 1547475 | 3.2 |
| Northern | 873059 | 957671 | 2.8 |
| Equateria | 903503 | 791738 | -0.7 |
| Bahr El Ghazal | 991022 | 1396913 | 2.0 |
| Upper Nile | 888611 | 836263 | -0.4 |
| All North | 7479400 | 11733432 | 2.7 |
| All South | 2783136 | 3024914 | 0.5 |
| Total | 10262536 | 14758346 | 2.2 |

Sources: 1955/56 population census and Department of Statistics 1975.

## 4.1 Population Map of Towns in the Sudan



The main characteristics of table 4.2 and table 4.3 are the following. Total population growth has been around 2.2 percent per annum, with concentration in Khartoum, former Blue Nile and Kassala provinces, because most of government and private investment including railways, irrigation, rainfed agricultural development, education, employment, health centres, etc, etc, has been concentrated in these regions. Minimal increases in the Southern provinces - decreases in Equatoria, upper Nile and slightly below average increase in Bahr el Ghazal. The decreases in Equatoria are mostly attributed to the civil war and the health hazards. The population densities in the concentrated area of Khartoum province and the central region are respectively 55 and 28 per square km in 1973; compared with between 3.6 and 6.8 per square km elsewhere.

The distribution of population by environment is shown in table 4.4. It indicates the development of population from 1969 to 1982 according to their environment. It can be seen in table 4.4 that most of the population is living, and will continue to do so, in the rural areas. The percentage of settled rural population in 1969 amounted to 72.4% of total population. Although it was envisaged by the Six Year Plan (SYP) that this percentage will go down to 65.7% in 1982, it still constitutes the major bracket of population. If we add to that the percentage of nomads the total percentage of both rural dwellers and nomads would be 84.1% in 1969 and 74.9% in 1982.

Table 4.3 Urban and Rural Population 1955/56 and 1973 Census

| | | 1955/56 | 1973 | Annual Growth Rate |
|---|---|---|---|---|
| Urban | North | 690396 | 2213014 | 7.1 |
| | South | 46737 | 274716 | 10.9 |
| Rural | North | 6789004 | 9520418 | 2.0 |
| | South | 2736399 | 2750014 | 0.03 |
| All | Urban | 737133 | 2487730 | 7.4 |
| All | Rural | 9525403 | 12270432 | 1.5 |

Source: 1955-56 census of population and the Department of Statistics 1975.

Table 4.4 Number of population in Sudan according to Environment in 1969/76 and the period 1980/82

Number in '000s'

| Year Starting July | Grand Total | | Urban | | Settled Rural | | Nomadic | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % |
| 1969 | 13233 | 100 | 2109 | 15.9 | 9568 | 72.4 | 1538 | 11.7 |
| 1976 | 16127 | 100 | 3290 | 20.4 | 11185 | 69.4 | 1652 | 10.2 |
| 1980 | 17832 | 100 | 4172 | 23.4 | 11950 | 67.0 | 1710 | 9.6 |
| 1981 | 18284 | 100 | 4427 | 24.2 | 12132 | 66.4 | 1725 | 9.4 |
| 1982 | 18752 | 100 | 4697 | 25.1 | 12315 | 65.7 | 1740 | 9.2 |

Source; The Six Year Plan, (1977-78 - 82-83) extracted from Table on page 91 of Volume 1.

On the other hand, according to the Six Year Plan the percentage of urban dwellers was expected to rise from 15.9% in 1969 to 25.1% in 1982. This is a sign of quick urbanisation in Sudan, being the result of the increase in both the absolute as well as the percentage figures of urban population through time at a rate exceeding that of the rural and nomadic population. Taking this from another angle, data from the 1973 census indicates that there is an increasing rate of internal migration from rural to urban centres in pursuit of better job opportunities and better standards of services in the

urban centres in Sudan, as is the case in other developing countries. This could be one of the problems facing the Sudanese agricultural sector with regard to rural employment.

### 4.2.2 Composition of 'Sex and Age' Structure of the Population of the Sudan

The age structure of a population is important data for social and economic planning. For example, it shows the potential labour force. Age is also an important variable in the study of mortality, fertility and labour force participation rates. The 1973 census table 4.5 shows that the population of the Sudan is young. 46.5% of the population are under 15 years of age. And 12.5% of the population are 45 years and over. The population between 15 and 44 years is 41%. The age structure of the Sudan population shows that fertility (nationally) is rather high. The low proportion of old people reflects that mortality rate is high and life expectancy is low (average 45 years).

The high fertility rate in Africa (2.9% per annum), means that age structures bulge disproportionately at the younger ages and successive age cohorts increase in size. These characteristics in turn imply that; (1) a greater proportion of resources are required to feed, clothe and educate the young, thereby reducing the availability of resources for productive investment.

(2) a greater proportion of investment is required to equip new entrants to the labour force, thereby limiting the extent to which capital per worker can be increased; and (3) a larger stock of labour is applied to fixed factors, such as land, resulting in diminishing returns.[4]

Table 4.5 The percentage distribution of population by age and sex 1973

| Age | Male | Female | Total Average |
|---|---|---|---|
| Under 15 | 47.8 | 45.3 | 46.5 |
| 15-44 | 38.9 | 43.1 | 41.0 |
| 45-64 | 10.0 | 8.6 | 9.3 |
| 65 and over | 3.3 | 3.1 | 3.2 |

Source: 1973 census

### 4.2.3 Fertility Levels and Trends

Recent evidence suggests that the fertility of the Sudanese nomads (estimated 10-25% of the country's population) is extremely low, the birthrate is found to be about 30 per 1000. The low fertility among the nomads can be accounted for by the poor nutritional standards, the bad health conditions and the absence of public health and elementary medical services. There is also a very high incidence of malaria and veneral diseases, and these combined with the other factors as well as the

amount and type of work performed by the nomadic women would no doubt result in a very high rate of pregnancy loss.[5] On the other hand, the fertility levels in the Gezira area are not only high, but have also been rising during the past few decades. This is because of better living conditions, better health services, higher income, earlier age at marriage etc. Here, the initial impact of modernisation in general seems to raise rather than lower fertility.[6]

There is widespread belief that an important reason for the prevalence of large families in LDCs is the economic advantage it brings to parents. Children may be economically useful during the parents' working life, contributing to the family income and taking on parental tasks in times of sickness or injury, and may support the parents when the latter are too old to work.[7] That child participation in economic activity is extensive in many LDCs from the age of six or seven is obvious to anyone who has visited them.[8]

### 3.2.4 Nomadic Population

Pastoral nomadism as practised in the Sudan is of three types; (1) regular movement of people, whole families with their animals in search of pasture and water. Each group has traditional and exclusive right of residence and exploitation over certain territory, '<u>dar</u>' (homeland). (2) Semi-nomadism - the situation where part of the family is left in the 'dar' while the remainder move

about with livestock in search of good pasture and water. Those left in the 'dar' engage in agriculture.

(3) Transhumance - this is highly developed form of pastoralism practised by sedentary cultures whose major economic activity is agriculture. The movement is generally undertaken from a permanent base.[9] Table 4.6 shows us that the 1973 census and FAO (1975) estimate applied the same definition as used in 1955/56. But the 1955/56 census definition was based on type of dwelling, so that it resulted in the exclusion of a large number of nomads. The census excluded a number of nomads, such as those cultivating small farms for a short period and the transhuman Nilotic groups. In view of the limited definition adopted above, some agrue an estimate of 25 to 40% seems to be realistic. [10]

Table 4.6 Size of nomadism in the Sudan

| Estimation | Nomadic Population | Percentage of the total population of the Sudan |
|---|---|---|
| 1955/56 census | 1405951 | 15% |
| 1973 census | 1600000 | 17.1% |
| FAO (1971) | 3000000 | 19.6% |

Source: Bayoumi - Guidelines towards Development of nomadism in the Sudan, 1975.

Nomadic population own about 90 percent of the livestock in the Sudan. But at present Nomadic population livestock contributes only 7 percent of the total export. The persistent neglect by the government for the nomadic livestock sector is said to be the main reason for the small size of its contribution to the economy. On the other hand, potentially, Nomadic livestock can contribute firstly, to the diversification of the economy, secondly, to the reduction of regional disparities and thirdly, to the modernisation of the traditional sector.

This section provided the main characteristics, age-sex structure and composition of the population growth rate in the 1970s had been around 2.6 percent annually. The 1973 census indicates that the population of Sudan are young. The implication is that, first, high dependency ratio and second high new entrants to the labour market. We have also seen that the vast majority of the population live in the rural areas. Furthermore, there is a concentration of the population in the central and eastern regions; this is mainly because most public and private investments are concentrated in these areas. In the next section, we identify the major characteristics of the labour force.

## 4.3 Labour Force

Availability information and studies about labour force in the Sudan is as scanty and at times it is even

inaccurate to the extent that reports about this matter had to resort to arbitrary estimates and guesswork. Bearing this in mind an attempt is made to use the appropriate sources to identify the major characteristics of the labour force and its historical development.

The 1955/56 census estimated the economically active population as 59.8% of the population aged five and over. Boys start to work at an early age, so that the great majority of men are economically active; the females participate to a markedly less extent in economic activity. For example, according to the 1955/56 census labour force participation rate was 52% for boys between the age of 5 to underpuberty and 96.5% for adult men. For females it was only 7% for girls and 9.4% for adult women. The 1973 census used a more restricted definition of the labour force participation and thus excluded all boys aged 15 years or under, as well as the vast majority of women. The crude activity rate is 47% for males, 11.8% for females and about 30 percent for the total population. 1973 census also estimates that labour force participation rates age 20 to 59, for males is as high as 92.2% and for females is 24.8%. Developing 'best guesses' of male and female participation rates defined, both narrowly and broadly, the ILO has come up with upper and lower estimates of the labour force in 1973 of 7.3 million and 4.7 million, as shown in table 4.8.[11]

The relation between population and labour force, that is, the participation rate of population in economic activity is indicated in table 4.9. As we can see from

table 4.9 the crude participation rate of population in labour force has gone up from 30.8% in 1969/1970 to 31.1% in 1976/77. That is an indication that the rate of growth of labour force during these two years is a little more than the rate of population growth. It can also be seen that this rate is much lower in the case of females (which amounts to 13.1% only during the first year) as against 48.4% for males. Then it fell to 12.8% for females as against 49.1% for males in 1976/77.

Table 4.8 Estimated labour force participation rates in the Sudan in 1973

| Sector | Age Group | Narrow Concept | | Broad Concept | |
|---|---|---|---|---|---|
| | | Male | Female | Male | Female |
| RURAL | Under 15 | 23-25 | 2-5 | 25-27 | 15-20 |
| | 15 and over | 92-95 | 10-15 | 92-95 | 60-64 |
| URBAN | Under 15 | 8-12 | 2-5 | 10-15 | 5-10 |
| | 15 and over | 88-90 | 8-10 | 88-90 | 10-12 |

Source: ILO. Growth, Employment and Equity 1975 p. 311.

The relative position of the Sudan compared to other Arab countries, is shown by the following figures for crude rates of population participation in the labour

Table 4.9 Population and Labour Force: crude and net rates for Participation in Labour force in 1969, 1973 and 1976 in the Sudan

in '000s' persons

| | 1969/70 | | | 1973 census | | | 1976/77 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Population | 6657 | 6576 | 13233 | 7424 | 7334 | 14758 | 8137 | 7990 | 16127 |
| Labour Force | 3222 | 862 | 4084 | 3593 | 961 | 4554 | 3995 | 1020 | 5015 |
| Crude rate of participation of population in labour force | 48.4% | 13.1% | 30.8% | 47.0% | 11.8% | 29.9% | 49.1% | 12.8% | 31.1% |
| Net rate of participation of population in labour force | 75.3% | 18.9% | 46.2% | | | | 75.9% | 18.4% | 46.4% |

Source: The Six Year Plan, page 94 and the 1973 census

force: 21.7% in Algeria in 1966; 27.9% in Bahrain in 1971; 26.4% in Egypt in 1973; and 32.8% in Kuwait in 1970. The rate in other countries is not much different from these rates.[12] It, thus, becomes obvious that the crude rates of labour participation in the Sudan are higher than in other Arab countries, despite the difference in the years of comparison. That is basically attributable to the agricultural sector in the Sudan and the higher contribution of young people in agricultural work. It is also partly due to the higher contribution of females compared to the situation in some Arab countries.

This section provided crude estimation of the economically active population in the Sudan, based on different assumptions and definitions of the labour force participation rate. For example, the 1955/56 census assumed broad definition of the labour force partcipation rate, and thus includes population age five and over. On the other hand, the 1973 census used more restricted definition of the labour force participation rate and thus excluded all boys aged 15 years or under, as well as the vast majority of women. At any rate, if we take the Six Year Plan (1977-83) estimation the labour force participation rate is 31.1% and if we berak it down by sex, then it amounts to 13.1% for females and 48.4% for males. Furthermore, a rough estimation of the labour force is presented as it was calculated by the ILO in 1975. In the following section we will look at where the increase of labour force growth is accomodated.

Table 4.10 Average annual rates of growth of population and labour force in the Sudan

| | 1960-70 | 1970-80 | 1980-2000 |
|---|---|---|---|
| Population | 2.2 | 2.6 | 3.0 |
| Labour force | 2.2 | 2.4 | 2.7 |

Source: World Bank Accelerated Development in Sub-Sahara Africa. Washington D.C. 1981 pp. 176-178

## 4.4 Labour Force Growth and its Accommodation

The labour force expanded during the 1960's and 1970's at a rate of roughly 2% per year on average in Sub-Sahara African countries. In the Sudan as it is shown in table 4.10 the pace of labour force increase was 2.4% in the 1970's. And the projected increase of labour force in the 1980-2000 is 2.7% per annum.[13] The population of the Sudan, like that of most LDCs is predominantly rural. Still about ¼ of the country's popoulation of about 20.5 million lives in urban areas and of this number about ½ live in Greater Khartoum and Port-Sudan. The total labour force in Sudan in 1983 was estimated to be around 6 million of which slightly more than one million would be urban.

The urban labour force in the Sudan would include

the following sectors, the government and public sector, the organized private sector and the unorganised private sector. Within each of these there is further division, such as professionals, skilled workers, white collar workers. These urban sectors of the labour market would function in relation to, on the one hand, the international market which attracts Sudanese labour, and on the other hand, the main rural labour groups:- agricultural labourers, traditional peasants, nomadic pastoralists and non-agricultural rural workers. The Government and the public sector corporations are the major urban employers, accounting about one quarter of all urban workers. Being the largest employers, they set the tone for organized private sector employment as well as the general basis for working conditions. The pay structure of the public sector is not determined by market supply and demand forces but institutionally.

In the organised private sector, although demand and supply forces play important roles, the effect of government employment policy is clearly felt in the labour market. By organised private sector, here, we mean permanent labourers in registered establishments of whatever size. The majority of urban workers are engaged in informal pursuits, that is, small enterprises and the self-employed. The informal sector refers to those self-employed or employed by private individuals, who are not subject to industrial or labour regulations. The urban labour force expanded much more rapidly than the total in Sub-Sahara

African Countries, the average urban growth rate being about 6% per annum. In the case of the Sudan if we take Greater Khartoum the rate of increase was 6.6% per annum in the period 1955/56 to 1973/74.

A large part of the increasing labour force was accommodated within the low productivity, small farmer sector in most African countries. In the Sudan wage employment both modern agricultural (irrigated and mechanized) and non agricultural sector has been rising by up to 50,000 jobs per year, which means that well over 150,000 entrants to the labour force have been finding employment in traditional activities characterized by low productivity and under utilisation of rural labour.

In the Sudan conditions of growth of urban industrial employment were less favourable, this is due to the poor performance of the modern agricultural sector and the numerous problems facing the industrial sector have meant that since 1975/76 there have been negative growth rates for all sectors and consequently a declining GDP in real terms. In fact, the industrial sector, and manufacturing in particular have fared badly in the recent years. Industrial investment has been limited and overall industrial production has remained virtually stagnant over the late 1970's and early 1980's. At present there is low capacity utilisation in most manufacturing firms (see Chapter 11 for detailed discussion). Hence, it became obvious a smaller portion of the growing labour force could be accommodated in the high paid wage sector

in the Sudan. And since small traditional agriculture tended to be a neglected, slow-growth sector in the Sudan, it is likely that the growth in the labour force dependent on farming was accompanied by underemployment and stagnant household income.

Employment creation, to a large extent is determined by the structure of the economy. Hence, manpower utilisation and employment problems are of different nature in developing countries, compared to developed countries. In a developed economy, characterized by institutional working conditions an increase in labour supply over labour demand will result in a proportionate increase in the unemployment rate. In a less developed economy, where the production system is largely organized around the household and where 'self-employed' or 'own-account workers' and unpaid family workers are the predominant categories, total employment can be stretched through work-sharing to include additional members in the labour activity. Addition to the output will be either zero or very marginal (i.e., marginal productivity of these new additions is near zero). So the reported unemployment rate in developing countries are low (see table 2.5) but underemployment levels are estimated well over 30 percent in many cases.

Table 4.11 provides industrial distribution of labour force by three major sectors for the Sudan. It is apparent that the industrial sector is still small from the point of view of its share in manpower which rose from 6% in 1960 to 10% in 1979. With regards to the size

of the labour force the service sector is larger than the industry sector. The service sector's contribution reached 12% of the total labour force in 1979. It is evident from table 4.11 that Sudan is predominantly agrarian and that the employment share of agriculture has not declined significantly, over time. In Sudan (in 1979) about eight tenths of the labour force is engaged in agriculture. This means that increases in labour supply continue to be pushed into this sector obviously in form of increasing underemployment level.

Table 4.11 Sectoral distribution of labour force during 1960 and 1979 (Sudan)

| Sector | Percentage of labour force | |
|---|---|---|
| | 1960 | 1979 |
| Agriculture | 86 | 78 |
| Service | 8 | 12 |
| Industry | 6 | 10 |

Source: World Bank Accelerated Devlopment in Sub-Shara Africa 1981 p. 178.

As we explained in chapter one the phenomenon of rural underemployment is difficult to define and even more difficult to measure in the Sudan, as is the case with many LDCs. A special problem is that under irrigated and rainfed conditions, typical of Sudanese agriculture,

the demand of labour is subject to sharp peaks and troughs. Labour is very scarce at the time of planting and harvesting; for whatever the explanations might be Gezira and Kassala areas face localized labour shortages in the peak seasons, particularly at harvest time in both the irrigated and rainfed sectors.

Seasonal peaks coexist also with a condition of labour surplus, taking the whole country under consideration. Some evidence along these lines is cited by UNDP/BRD and others (1983) study based on field sample in the Sudan. Findings of the study show that more than 90 percent of the agricultural labour force in the two regions (South Kordofan and North Darfur) stay idle and unutilized for five months during the year (January, February, March, April and September).[13] The two regions, therefore are bound to continue to be considered as 'push areas' of seasonal labourers required for cotton picking and other agricultural operations during these months, in the irrigated and mechanized agricultural sector in eastern and central Sudan.

This section supplied the estimated labour force growth rate in the 1980's which is about 2.6 per annum. The average urban labour force growth rate, taking Greater Khartoum as an example is about 6% per annum. Obviously, urban labour force growth is determined by the difference in the rate of increase of birth rate over death rate and migration. It is also shown that the increase in urban labour force growth was not accompanied by the increase of urban industrial employment, and this

is partly due to the chronic problems facing the industrial sector in the Sudan. Hence, a small portion of the growing labour force could be accommodated in the high paid wage sector in the Sudan. This means that a large part of the increasing supply of labour force was accommodated within the traditional low productivity sector. And since the small traditional agricultural sector tended to be neglected slow growth sector in the Sudan, and also total employment can be stretched through work sharing to include additional members in the labour activity; it is likely that the growth in the labour force dependent on farming was accompanied by underemployment.

## 4.5 Conclusion and Summary

The population of Sudan was estimated at 18.4 million in 1983 rising at an annual rate of 2.8 percent. About 71 percent of the population live in rural areas, 18% in urban and semi-urban areas, and the remaining 11% are nomads. At the 1973 census 47% of the population were under 15 years of age. It means that the population of the Sudan is mostly young. And this implies, firstly high dependency ratio and secondly high new entrants to the labour market.

The population is concentrated in the Central and Eastern regions of the country, where the population densities were Khartoum province 55 and Kassala 28 per

square km in 1973 census, compared with between 3.6 and 6.8 per square km elsewhere. This population trend is expected because, most of the irrigated and mechanised rainfed agriculture is in Khartoum and Kassala provinces, in the Central and Eastern regions of the Sudan. The transport, power, schools and industry are also concentrated in the Central and Eastern regions; the regions in the West and South lag behind.

Real Sudanese GDP grew at an annual rate of only 0.6 percent between 1960-79. The population was believed to have been growing annually at a rate of about 2.8 percent, implying an annual decline in per capita income of above 2 percent.

Land does not impose any constraint on agricultural development of the country. The cultivable land is estimated to be about 84 million hectares. Only about 8 percent of this cultivable land is being utilised in agriculture.

But agriculture, as an economic factor, and farming as an occupation are both shown to account for nearly 78 of the total population employment; the industry sector accounts for only 10 percent as against 12 percent for the service sectors. Modern-sector employment - both agricultural and non-agricultural - has been rising by up to 50,000 jobs annually, which means that well over 100,000 entrants to the labour force have been finding employment in traditional activities characterised by low productivity and the under-utilisation both of time and ability.

The government, if one looks at the successive development plans, has neglected both the traditional agricultural sector and the nomadic population. The nomadic population in the Sudan owns 90% of the livestock of the country. The trick for concrete development perhaps lies in how one can generate the mobilisation and full participation of the Sudanese population.

There are those who argue that there is a significant seasonal labour shortage and support for more mechanisation. On the other hand the ILO (1976) and the UNDP/IBRD and Sudan Ministry of Finance and Economic Planning Study (1983), while accepting localised seasonal shortage of labour, revealed the existence of a considerable degree of underemployment of rural labour. They argue that the overall supply of labour would respond quite readily to increased wages and reduced cost of migration.

We have seen that the population of the Sudan is increasing at the rate of 2.8 percent annually; and the 1973 Sudanese census results show that 47 percent of the population are young. The direct impact of these results are; firstly high dependency ratio and secondly, that concerns us most here, is the high new number of entrants to the labour market in addition to the already unemployed and underemployed persons. Furthermore while accepting localised seasonal shortage of labour, it is now generally believed the existence of a considerable degree of underemployment of rural labour nationally.

The next chapter on migration examines internal migration and emigration in the Sudan and shows how demand and supply of labour are balanced from the surplus to the shortages areas. And furthermore, assesses the impact to Sudanese labour market the emigration of skilled labour to oil rich Arab countries.

Footnotes to Chapter Four

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3. L. Squire: Employment policy in Developing Countries; a Survey of Issues and Evidence, Op. Cit., p. 18.

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5. R.H. Henin: Fertility Differentials in the Sudan with reference to settled and Nomadic population (unpublished PhD Thisis: London, University of London; 1964) p. 25.

6. R.H. Henin: Ibid., p. 26.

7. P. Streeten and R. Jolly: Recent Issues in World Development (Oxford, Pergamon Press, 1981) pp. 6-7.

8. P. Streeten and R. Jolly: Ibid., p. 8

9. M.S. Bayoumi: Guidelines Towards Development of Nomadism in the Sudan. M. Suliman (ed.): Issues in the Economic Development of the Sudan (Khartoum, Khartoum University Press, 1975) p. 96.

10. M.S. Bayoumi: Ibid., pp. 97-98.

11. ILO: Growth, Employment and Equity: A Comprehensive Strategy for the Sudan, Op. Cit., p. 312.

12. ILO: Manpower and Employment in Arab Countries: Some Critical Issues (Geneva, ILO, 1975) p. 15.

13. UNDP/IBRD and Sudan Ministry of Economic Planning: Rural Labour Study in Northern Sudan, Op. Cit., pp. 159-60.

# CHAPTER FIVE

# MIGRATION

## 5.1 Introduction

In general terms the definition of migration that is operated for the purposes of data collection is that migration is "any residential movement which occurs between administrative units over a given period of time". From whatever academic discipline population migration is examined there is basically only a limited range of questions to be asked concerning any particular migration phenomenon; why does migration occur? Who migrates? What are the patterns of origin and distribution and of the flow between them? What are the effects of migration on the areas, communities or societies that the migrant came from? What are the effects of migration on the areas communities or societies of destination? These crucial questions will now and then come when we examine migration with the experience of the Sudan.

The form of migration commonly cited is rural-urban migration, most probably because of its contribution to city growth. In many countries other types of migration such as intra-rural seasonal, emigration, and other forms of population mobility are even more important and have been neglected in the literature as well as in the policy making process. The types of migration in the Sudan are rural-rural, rural-urban and emigration obviously; the main objective of this movement is primarily seeking

jobs and to earn higher income.

The population of the Sudan is 20.5 million (1983) out of which the economically productive labour force is estimated to be around 6 million. It is estimated that out of the country's estimated 6 million labour force about one million are the number of men and women who move around in the Sudan during any year in response to geographic disparities in employment opportunities.[2] The estimated one million migrants include rural-urban (20%) as well as rural-rural (80%) migrants, but it excludes the movements of nomadic cattle herding people in response to variations in rainfall which amounts to perhaps another million.[3]

A recent field reconnaissance mission report (1983) estimated half a million the number of Sudanese nationals working abroad.[4] However, it is widely accepted that official emigration number forms only a minor proportion of the total number of emigrant labourers. Gahal El Dim, in his study estimated that unrecorded emigration could account for as much as 70-80% of the actual migration for work from the Sudan. Even if a more conservative estimate of unofficial emigration rate of two thirds is taken this implies a total of one million Sudanese migrant workers abroad.[5] Emigration of the Sudanese to Arab Oil States is part of a relatively recent phenomenon dating mainly from the middle of the 1970's and reflecting in essence the increased demand for labour from the Arab Oil States.

Internal migration has been going on in the Sudan, as we see it at present in a massive form since the

starting of the Gezira Irrigation Scheme by the British in 1925. In the Gezira Irrigation Scheme about 1,200,000 feddans are under cultivation mainly cotton and other crops such as wheat, sorghum and groundnuts. The family labour of 96,000 tenants is supplemented by migrant labour of about 400,000 per year. Mechanized farming was initially introduced in the Eastern Sudan in 1944, but is only in 1954 the current system of large-scale mechanized farming was established based on 1000 to 1500 feddans production per year. An area of 3 million feddans is utilized under mechanised farming production and employs more than half a million seasonal labour per year. Hence, one can clearly see the development of large scale machanised farming and highly capitalised irrigation mainly in the eastern and central regions has required the massive influx of seasonal labourers.

With this short background on migration, this chapter addresses itself to the following crucial issues. First examine how the supply and demand of labour are balanced through migration, secondly, identify the bottlenecks to the movement of labour from surplus to shortage areas, thirdly, look as to how can mobility of labour be facilitated to enable surplus labour to seek employment wherever it is available; fourthly, look at the mechanism of labour migration and fifthly, assess the cost and benefit of emigration.

## 5.2 Rural-Rural Migration

### 5.2.1 Introduction

As we discussed in the introductory part of this chapter, the Sudan has a very high rate of internal labour migration estimated to be about a million labourers per year. Nearly 800,000 (80%) are rural-rural migrants. Since rural-rural migration is the core in the Sudan internal migration process, in depth analysis of the determinants and consequences of rural-rural migration, and effects of migration on areas of destination are examined, taking the example of Gezira irrigation scheme and mechanized agricultural sector, located in the Central and Eastern Sudan. The analysis of the rainfed mechanized farming is based on the spot interviewing of the seasonal agricultural labourers in the semi-urban towns in eastern Sudan in April 1984.

### 5.2.2 Factors Influencing a Person's Decision to Migrate

Economists focussed on economic factors influencing migration, especially wages and income levels and levels of unemployment. The focus on the economic factor influencing migration has been criticised because of its exclusion of non-economic variables and the failure to analyse migration at the individual or household level, the level at which migration decisions are usually made.[6] Recently attempts have been made to incorporate the

subjective appraisals of migrants in cost-benefit models of migration.

In the Sudan case the determining factor influencing this inter-regional migration and the demand and supply of labour in irrigated and mechanized rainfed agriculture, is the extremely skewed distribution of public and private investment of both capital and expertise between the modern and traditional agricultural sector. This large disparity in investment between the modern and traditional agricultural sector is also reflected in regional imbalances; about 90 percent of the modern irrigated and mechanized farming scheme are located in Central and Eastern Sudan. While in the West and South of the country traditional small-holder agriculture predominates.

The development of modern irrigation and mechanized farming mainly in the eastern and central regions has required massive influx of seasonal labourers. Poverty in the West and South, Government neglect and lack of interest in developing traditional agriculture, the lack of credit and modern production inputs to increase productivity has thus forced a large number of the rural poor (mainly from Western Sudan) into migrant agricultural labouring jobs.

In general the forces exerting an influence on migrant perceptions are divided into 'push' and 'pull' factors. If we take the Sudanese case, the push factors are (1) lack of job opportunities, (2) population pressure, (3) the amount of rainfall in the Western Sudan of out

migration and (4) the distance that must be travelled to obtain work. The years from 1965 to 1973 were years of low rainfall in Darfur and Kordofan when it was difficult to eke out a living from traditional agriculture, while 1974 was a year of good rains. Consequently, the recruitment figure of the Gezira Board Offices in Southern Darfur showed a drop from 20,000 people per year in the period 1965-73 to a low of 4.000 people in 1974.[7] For those living in Darfur and Kordofan the cost of transport must be a crucial factor to migrate. The Gezira Board recruits its workers in the Western regions and transports them gratis but only one way. Migrant labour comes as far away as Darfur and Kordofan (Western regions) a distance of up to 1100 kilometres. The effect of single transport payment only by the Gezira Board is making migrants reluctant to return immediately, thus adding to the pool of semi-permanent labour available in the Eastern and Central regions. The 'pull' factors attracting migrants to destination areas in the expectation of improving their lot are; (1) the rates of pay per day in cash and kind offered for sowing, weeding and harvesting, (2) the job availability and (3) the low cost of migration due to the presence of friends and relatives - who initially provide shelter and basic amenities.

### 5.2.3 Types and Duration of Migrant Labour

Having discussed and outlined a number of important points to be considered in answering such question as

## 5.1 Migration in the Sudan

N.B. The arrows indicate the migration of labour mainly from western to eastern and central Sudan.

what factors influence a person's decision to migrate in the Sudan attention may now be given to the consideration of the types and duration of migrant labour.

The migrant population in the Sudan may be considered roughly speaking, to consist of four groups when it is classified according to the time period over which migration is effective. First, there is a small minority of males who are at the point of settling permanently either because they have secured a plot of land or because they have finally obtained a more or less secure job in one of the smaller towns. (2) A second group consisting equally of men and women is halfway between moving around and settling down; they may have established a certain link with particular employers year after year. (3) A third group of males, possibly one-third of total migrant population, are maximising their earnings over a short time period and are therefore highly mobile; they drift around during most of the year and after two or three years they have saved enough money to return home, possibly never to migrate again. Finally, there is a fourth group, another one third of the migrant population made up as much of women as of men, which is the only one to confirm the traditional picture of the seasonal cotton pickers who return to their home area as soon as the cotton is harvested.

The UNDP/IBRD and others study (1983) has disclosed that more than 250,000 persons, representing 3% of the resident rural population, spent varying periods of time during 1981 outside their villages. 14% of them spent

less than three months. 67% spent a period ranging between three months but less than six months. 13% spent six months but less than nine months while 5% spent six months but less than a full year. Most of those who returned to their home villages were from North Kordofan (31%), White Nile (24%), Blue Nile (17%), Kassala (15%), and South Kordofan (13%).[8]

Having analysed the type and duration of migrant labour in the Sudan, the next section identifies the major causes for the low participation of tenant family labour in the Gezira irrigated agricultural scheme.

### 5.2.4 Gezira Irrigated Agricultual Scheme

#### 5.2.4.1 Causes for the Low Participation of Tenant Family Labour

Rural-rural migration, mainly from the Western regions to Eastern and Central regions, has been highly accelerated with the commercial development of the Gezira irrigation scheme, since it's beginning by the British in 1925. The Sudan Gezira Irrigation Scheme covers an area of 1.2 million feddans (740,000 hectares) and produces main cash crop cotton and subsidiary crops of wheat, millet and groundnuts. The Gezira Irrigation Scheme is a tripartite partnership between the Sudan Gezira Board (SGB), the Government and tenants. Formally speaking the SGB is responsible for management and marketing of cotton, the government, through the Ministry of Irrigation for the supply of water, and the tenants for the provision

of labour.

The original concept of the Gezira tenancy was to provide both a cash crop for export and the subsistence crops in an area which could be worked with labour supplied mainly by the family. This has not worked out in practice, and the scheme has since its very early days been heavily dependent on hired (local and migrant) labour. As we see in table 5.3 it is estimated that active tenant family supplied only an average of about 30 percent of the total labour supply requirement. The family labour of 96,000 tenants is supplemented by migrant labour of above 400,000 per year.

Then, the obvious question is what are the possible causes for low participation of tenant family labour in the Gezira Irrigation Scheme. One of the major problems has been attributed to the existing sharing system in the scheme (the joint account system). Cotton net proceeds are divided between government, the Sudan Gezira Board and tenants. It is contended that the joint account gives insufficient incentives to the tenant to increase production. For example, the joint account system distorts costing because it collects scheme costs only from cotton proceeds irrespective of the crop on which they were incurred. When groundnuts and wheat were introduced as additional cash crops, they (like dura and fodder - mass cash crops) were not included in the sharing system operating for cotton, the tenants' interest in cotton began to decline, and they began to be more concerned with non-cotton crops which

they market independently. To rectify the problem with the joint account system recently a new system - the individual account system was introduced in the Gezira Irrigation Scheme.

The second factor is that education at all levels has little relevance to the agricultural activities in the area. Furthermore, people in the Gezira scheme are socially biased to academic education and associate agricultural work with inferior social status. Consequently, young people leave the area after school or take jobs outside the agricultural sector. Even the tenants themselves are now resorting to off-farm business and regard work in the tenancies of secondary importance. Growing off-farm interests reduce family labour participation for at least two reasons; it physically reduces the available labour force in the family due to the withdrawal of the tenants themselves and reinforces prejudiced attitudes towards agricultural work.

We see in table 5.3 that tenant family labour supply only an average of 31% of the total demand for labour, and above we identified the major causes for the low participation of tenant family labour. The next question is to investigate how the gap in labour demand requirement is fulfilled?

### 5.2.4.2 Seasonal Labour Requirements and Labour Recruitment Practice

In the Gezira Irrigated Scheme, of all the crops

Cotton is the most labour intensive, and almost half of the land in the Gezira scheme is under cotton. Table 5.1 shows that the demand for cotton labour is concentrated in the period from January to April with peak periods in August and September for weeding and in January to March for picking; the labour demand for groundnuts peaks in June and July and in December and January that for Sorghum (dura) in June and July and December; and that for wheat from mid-November to March. The total demand for seasonal labour in the Gezira is thus concentrated in eight months, July and August and November to April.

Where does all the seasonal labour in Gezira come from? Table 5.2 provides some evidence on cotton picking. Roughly half of the labour comes either from the families of the 96,000 tenants or nearby villages. The other half comes from outside the area from as far away as Kordofan and Darfur, a distance of up to 1,100 km, or from Kassala, distance of about 300 km. In December of each year the Sudan Gezira Board makes a forecast of labour requirements for the cotton picking period including a forecast of labour available from local sources. The need for imported labour is met in three ways.

(i) Labour imported by the tenants themselves who sometimes travel to Southern Darfur and Eastern Kordofan to recruit the labour they need - almost half of peak period needs are met in this way.

(ii) The SGB sets up picking labour committees jointly with the tenants and the Government in different

provinces. This method recruits about 15% of the peak needs.

(iii) Self-recruited labour which acts on the basis of information passed by word of mouth concerning likely demand and wage rates. Self-recruitment accounts for about 35% of the peak period need.

Table 5.1 Seasonal fluctuations in labour requirements for principal crops in the Gezira Board area 1973-74 (man-days per month per feddan)

| Month | Cotton | Groundnuts | Sorghum | Wheat |
|---|---|---|---|---|
| January | 10.70 | 10.02 | 0.10 | 1.40 |
| February | 15.22 | 2.17 | - | 1.26 |
| March | 11.45 | - | - | 0.63 |
| April | 4.31 | - | - | 1.18 |
| May | 6.30 | 0.34 | 0.03 | 0.12 |
| June | 0.91 | 3.05 | 1.23 | - |
| July | 0.82 | 6.89 | 4.75 | - |
| August | 5.50 | 7.82 | 2.68 | - |
| September | 5.40 | 2.92 | 0.98 | 0.34 |
| October | 2.30 | 2.36 | 2.08 | 1.04 |
| November | 1.22 | 2.31 | 10.34 | 2.10 |
| December | 1.50 | 12.71 | 3.24 | 1.22 |
| | 65.63 | 50.59 | 25.43 | 9.29 |

Source: Mohamed Shazali Osman 'Large scale agriculture and employment creation.' 1975.

The migrant labourers will have the following information available to them on deciding whether and on what terms to make the journey; they will know something of the preceding year, of the year's wage trends; they may have certain targets of cash that they want to earn in order to satisfy certain needs that they have, they may have an idea from other nearby communities or from travellers, of the level of wages which is likely to be forthcoming for the present season.

The second type of migrant labourers are the family, who travel as a unit. They travel in their own slack season. In the calculations of family, travelling as a unit, security of living conditions and consistent availability of work will be more essential than for the first group. For this reason, they are probably less money-responsive, valuing other elements of wage contracts. the reason why such household groups make the journey is because their traditional agriculture does not provide them with enough to meet all their needs at the level of life to which they aspire or require as a basic survival necessity. In 1983, the average cotton picking daily wage rates were £S1.92 for men and £S1.33 for women.

Table 5.2 shows cotton picking labour in the Gezira scheme for 1977/78-82/83 by recruitment practices. About half of the required labour is contributed by the tenant family labour and local labour; and the other half by the migrant labour. Table 5.3 is an extension of table 5.2 and indicates average number of persóns of six years (1977/78/82/83), by recruitment practices. Table 5.3

Table 3.2

Cotton picking labour in the Gezira scheme 1977/78-1982/83

| Season | Tenant and Family | Local Labour | Recruited by tenants | SGB/DOL recruitment centre | Floating* | Total wage Labour | Grand Total |
|---|---|---|---|---|---|---|---|
| 1977/78 | 127871 | 63677 | 237008 | 67344 | 10188 | 378217 | 506088 |
| 1978/79 | 132703 | 69116 | 252877 | - | 7877 | 329870 | 462573 |
| 1980/81 | 131627 | 77473 | 150729 | 35289 | 5161 | 268622 | 400249 |
| 1981/82 | 124979 | 77399 | 132450 | 29311 | 3518 | 242677 | 367656 |
| 1982/83 | 145719 | 86380 | 152808 | 51351 | 3209 | 293748 | 439467 |

Source: Sudan Gezira Board, Department of Tenant Affairs - The Gezira Current Statistics Season 82/83, SGB. Economic and Social Research Unit - Compilation.

*'Floating' is the term used by the SGB to describe self-recruiting labour which moves into the Gezira scheme without being recruited and transported by tenants or the SGB.

Table 5.3 Picking Labour Statistics for Gezira Scheme
Average for Years (1977/78 - 82/83) in percentage

| Tenant and family | Local Labour | Recruited by tenants | SGB recruitment centre | Floating | Total wage labour | Grand Total |
|---|---|---|---|---|---|---|
| 131790 | 72303 | 192300 | 23190 | 5757 | 293550 | 425340 |
| 31% | 17% | 45% | 5.5% | 1.5% | 69% | 100% |

Source: Own Estimates based on SGB statistics 1982/83.

shows that family labour supply only an average of 31% of the demand for labour and 69% of the demand for labour is supplied by local labour (17%), and migrant labour (52%). This table also indicates that an average of 45% of the migrant labour is recruited by the tenants themselves.

## 5.2.5 Seasonal Agricultural Labourers in the Mechanized Farming Sector

### 5.2.5.1 Introduction

In the previous section we examined how the demand and supply of labour are balanced in the Gezira Irrigated Agricultural Scheme. Next we will examine rural-rural migration with the reference of Seasonal agricultural labourers in the mechnized farming sector of Eastern Sudan. This study is based on original spot interviewing of 121 seasonal agricultural labourers in Tawawa and in the area near Gedaref in Eastern Sudan by the researcher and two assistants between March and May 1984.

The investigation and analysis will focus on the features, maladjustments and trends in the rural labour market in the rainfed mechanized farming of Eastern Sudan, looking in particular at the ways in which different socio-economic groups are affected by these processes. The spot interview study found that the majority of seasonal agricultural labourers are either migrant from the West and South of the Sudan or are refugees.

### 5.2.5.2 Labourers and Origin of Migration

In order to examine seasonal agricultural labourers' reasons for engaging in this type of activity, and their position in and degree of control over the labour market process, a survey of 121 labourers was carried out in Tawawa and in the area around Gedaref.

Table 5.4 Percentage distribution of labourers by place of birth

| Place | Place of Birth |
|---|---|
| Eastern region | 10 |
| Central region | 6 |
| Southern region | 10 |
| Western region | 51 |
| Ethiopia (Eritrea) | 22 |
| Chad | 1 |
| Total | 100 |

Source: Computed on the basis of Field Survey data 1984

Table 5.4 shows that just over half (i.e. 51%), of the seasonal labourers interviewed in the survey were born in the western region. The refugees from Eritrea and other parts of Ethiopia accounted for 22 percent of the repondents. All respondents were male. Perhaps, this is consistent with the clear predominance of men in farming in the Kassala province. It reflects the relative immobility of women engaged in child care and domestic work who tend to undertake

employment nearer home. The majority of the respondents were under 30 years of age. Nearly half were household heads, most of whom were married.

Table 5.5 Land area cultivated in 1983 by respondents and their households

| Feddans | Percent of respondents |
|---|---|
| 0 | 51 |
| 1-4 | 13 |
| 5-9 | 12 |
| 10-19 | 15 |
| 20-39 | 6 |
| 40+ | 3 |
| Total | 100 |

Source: Own calcultaion based on Field Survey Data 1984

5.2.5.3 Reasons for Seeking Labouring Jobs

Table 5.5 indicates that a main factor in pushing people into accepting casual agricultural labouring work is the small size of landholdings. About half of the sample survey interviewed did not cultivate any personal or family crops in 1983, and only 10 percent farmed more than 20 feddans. The respondent's own reported reasons for engaging in agricultural labouring jobs stress the over-riding need for cash. It is interesting that 17%

of those interviewed intended to buy livestock, most probably to increase their income at home and thereby avoid the need to migrate (see Table 5.6).

Table 5.6 Reasons for accepting labouring jobs

| Reasons | Responses | |
|---|---|---|
| | Number | Percent |
| Money | 55 | 46 |
| Expenses (personal) | 23 | 19 |
| Marriage | 12 | 10 |
| Buy | | |
| Livestock | 21 | 17 |
| Shop | 7 | 6 |
| Land | 3 | 2 |
| | 121 | 100 |

Source: Own calculation based on field survey data 1984.

5.2.5.4 The Recruitment Process

The majority of the large commercial farmers have offices in Gedaref and it is to these that most would-be labourers make their way. About 85 percent of work agreements are negotiated directly between the employers and labourers. The contractors' role in recruiting labourers from the west and south of the Sudan, is

reported to have declined in recent years since the refugee influx considerably increased the supply of labour available in the eastern region.

While 14 percent of the interviewed live locally, virtually all of the others travelled to Gedaref with friends or relatives. Group companionship provides obvious psychological security by sharing the difficulties of looking for work and lodging, withstanding the strains of periods of unemployment, and caring for those who fall sick. Also, it is convenient for the employers since the whole labouring system is built on group hiring and group pressure to produce good work.

Labourers gather on the pavements outside the employers' offices. A commercial farmer needing labourers will bring a lorry to the office and several groups of men will scramble to get in. They are taken to the fields where the wage bargain is negotiated. There is no fixed daily or piece rate; the payment for each task is negotiated separately for the group as a whole. This consists of a cash and a kind component. The labourers usually first walk round the area to be weeded or harvested before the negotiations start. When bargaining for a weeding task they would take into account such factors as the area to be weeded, the weed growth and the extent to which the plants are choked. Various forms of pressure are put on the labourers to settle somewhere near the employers' wage offer. Apart from their own assessment of the supply of unemployed labour in Gedaref, the employer may negotiate with several groups

at the fields at the same time. If they do not reach an agreement the labourers are expected to walk back to Gedaref which may be many miles away. Given that they are generally under-nourished and they are fed by the employers if they stay and work, there is a strong incentive to avoid a long walk in the hot sun.

#### 4.2.5.5 Reported Problems of Employment on Large Farms

The main problems reported by labourers interviewed concerned the cash and kind payments. Two problems might need some clarification. After completing the task the labourers return to the farmer's office in Gedaref for payment, carrying a note from the agent to confirm thay they have done the work satisfactorily. However, on arrival they sometimes find that the farmer is absent or makes excuses to delay payment. This generally causes considerable hardship as the labourers are usually short of money and may well have difficulty in buying food. Moreover, it is impossible for them to accept new work which would take them far from Gedaref again before securing their employment.

The second complaint refers to the situation in which farmers are reluctant to accept the agent's note at face value and insist on visiting the fields with the labourers to check the work themselves. If they are not satisfied with the work or if, as often happens, it has rained heavily again after the labourers have finished and the weeds have regerminated, they would generally insist on the labourers

reweeding all or part of the land for no extra payments.

The labour office in Gedaref receives six to eight complaints a day mainly about employer's alleged defaults in settling the cash components of the agreement or demanding extra work without an additional payment. However, since the labour laws specifically exclude agricultural labourers, he advises them that their only redress is to take the case to court. Given the cost of legal fees, the time that it would take to get a hearing and the difficulties illiterate labourers (particularly if they are not Arabic speakers,) would face in dealing with an unfamiliar court, it is hardly surprising that few take up this option.

It appears that labourers (whether they are from the west or south of the Sudan or refugees from Eritrea and Ethiopia), are very vulnerable to unfair treatment by merchant farmers, but in the absence of detailed data and records of complaints made to the labour office it is impossible to estimate the prevalence of these complaints and whether a large number or merely a few mechanized farmers are involved.

Agricultural labourers are at present explicitly exempted from the Sudanese labour laws. The difficulties involved in organising an agricultural workers' union are clearly considerable given the ethnic diversity among the refugees and Sudanese migrant labouring population, the generally low educational and literacy levels, and lack of experience with the administrative and legal systems. These handicaps are compounded by the temporary nature of

the work, continual movement from farm to farm, the enormous distances between the irrigated and mechanised schemes in the different regions of the country. However, despite these obvous difficulties of enforcement it seems imperative on grounds of equity that the laws should be extended to include this category of agricultural workers in order to recognise, at least, their rights to legal protection.

The minimum that can be done for a start is that the existing labour officers could be given formalised instructions and if necessary training, in the systematic recording of complaints by agricultural labourers and any subsequent court proceedings. They could be empowered to give advice to the labourers and warnings and advice to employers.

In this section we analysed the process and constraints of labour migration from surplus to shortage areas of rural Sudan. In the following section we examine rural-urban migration in the Sudan, taking, mainly, the example of Greater Khartoum.

## 5.3 Rural-Urban Migration

### 5.3.1 Some Specific Theories of the Determinants of Migration

Theoretical explanations of rural-urban migration have a long history, dating from at least to the 1880's when Ravenstein (1885 and 1889) first proposed his laws

of migration. The importance of the economic motive in the decision to migrate, the negative influence of distance and the process of step-migration were some of the features of Ravenstein's approach.

But the first well-known economic model of development to include as an integral element the process of rural-urban labour transfer was that of Lewis (1954)[9] later extended by Ranis and Fei (1961). This model considers migration as an equilibrating mechanism which, through transfer of labour from the labour surplus to the labour deficit sector, eventually brings about wage equality in the two sectors. The model is based on the concept of a dual economy, comprising a subsistance, agricultural sector characterized by underemployment and a modern industrial sector characterised by full employment.

Despite the appeal of the dual economy model, most observers have found it unsatisfactory because of a number of shortcomings (for example, Das Gupta 1979 [10]). First, migration is not induced solely by low wages and underemployment in rural areas. Second, the assumption of near Zero marginal productivity and surplus labour in agriculture has been widely criticised on empirical grounds. Third, the model assumes a high rate of expansion of employment opportunities through investment of the rural surplus in the urban sector. In fact, the rate of growth of employment in the modern industrial sector has generally not been sufficient in developing countries to absorb the increasing labour supply resulting from both natural population increase in the urban sector

and net rural-urban migration. As a consequence the net effect of rural-urban migration has instead been to shift underemployment from the rural to the urban sector.

The fundamental contribution of Lewis (dual economy) model is in emphasising two major elements in the problem; the difference between the rural and urban sectors and the enormous significance of the transfer of labour between them. These two elements have been developed along new lines by Todaro in a model which suggests that the decision to migrate includes a perception by the potential migrant of an 'expected' stream of income which depends on both prevailing urban wages and a subjective estimate of the probability of obtaining employment in the urban modern sector (Todaro, 1969, 1976), which is assumed to be based on the urban unemployment rate.[11]

In the Todaro approach migration rates in excess of the growth of urban job opportunities are not only possible but also rational and probable in the face of expected large positive urban-rural income differentials. High rural-urban migration can continue even when high unemployment rates exist and are known to the potential migrants.

A major weakness of the Todaro model is its assumption that potential migrants are homogeneous, in respect of skills and attitudes and have complete information for working out the probability of finding a job in the urban modern sector.[12] The following section examines the process of rural-urban migration in

the Sudan.

### 5.3.2 Rural-Urban Migration in the Sudan

Between 1955/56 and 1973/74 the population of Greater Khartoum increased from 253,000 to 799,800, a growth rate of 6.6 percent per annum. Since the natural population increase for the country as a whole was only 2.3 percent per annum over this period, most of this growth must have been due to migration from rural and other urban areas.[13] However, the growth in the urban population as a result of rural-urban migration has not been matched by a concomitant increase in urban industrial employment.

Todaro contends that migrants typically do not represent a random sample of the overall population. On the contrary they tend to be disproportionately young, better educated, less risk averse and more achievement orientated and to have better personal contacts in destination areas than the general population in the region of out-migration.[14] A Household Socio-Economic Survey of Greater Khartoum shows that over 80 percent of the migrants came from nine of the 12 northern and central provinces, whereas the three Southern regions contributed few migrants to the area. Forty-seven percent of the recent migrants stated that their last place of residence had been a rural area, while 53 percent reported an urban area.[15] The household survey of Greater Khartoum also shows that among recent migrants 69 percent

of the males and 67 percent of the females were between the ages of 15 and 29. Only 4 percent of the males and 11 percent of the females were over 50.[16] It thus appears that most migrants leave home early in their working life, largely in order to maximise the number or years over which urban incomes can be earned.

Table 5.7 Recent migrants by level of education and sex 1975

| Level of Education | Percentages | |
|---|---|---|
| | Males | Females |
| | No=573 | No=374 |
| No formal education | 40 | 67 |
| Primary not completed | 10 | 4 |
| Primary completed | 26 | 21 |
| Secondary not completed | 13 | 4 |
| Secondary completed | 9 | 3.5 |
| University or higher technical | 2 | 0.5 |
| | 100 | 100 |

Source: Oberai, A.S. International Labour Review, Vol. 15, no. 2, 1977, p. 213.

Figures concerning the educational attainments of recent migrants are given in table 5.7 which shows that

60 percent of the males and 33 percent of the females had at least some formal education, while 50 percent of males and 29 percent of females had a full primary education or better. The migrants had a significantly higher level of education than the average population in the northern and central provinces, where as mentioned earlier most of them originated.

### 5.3.3 Reasons for Migration

The principal pull factors seem to have been higher average annual earnings, job availability, better educational opportunities, and the low cost of migration due to the presence of friends and relatives in the three towns. If we look at the distribution of recent migrants according to their main reason for moving to the Greater Khartoum, we find that 67 percent came to seek employment, 16 percent for further education, and 17 percent to join relatives.[17] Nearly half of those who were already attending school moved in search of more or better education. The fact that 89 percent of those who were working before the move came in search of employment shows that either they did not have adequate work in their previous place of residence or their incomes were lower than those they expected to earn in Greater Khartoum.[18] A 1967-68 household survey indicated that average household expenditure in urban Khartoum was £Sud 456 whereas the average for the other six provinces investigated was only £Sud 196.[19]

An important question is that if the earnings differential is the dominant force behind the migratory movement from the northern and central regions towards Greater Khartoum, why do the three southern regions contribute so few migrants? The south is at least as poor, if not more so. Perhaps the answer lies in factors such as long distances, high transport costs, the absence of friends and relatives to provide initial help and information, low levels of education, and political, cultural, ethnic and religious differences.

Dominant among the push factors are population pressure, lack of job opportunities and climatic conditions leading to low agricultural productivity and incomes. The village survey shows the extent of poverty in rural areas. In roughly half of the villages surveyed in the northern regions between 50 and 80 percent of the men were willing to accept jobs elsewhere for long periods, and in two villages out of the four surveyed in the Red Sea region the male population was willing to migrate in its entirety, the annual incomes there being less than £Sud 50 per household.[20]

In this section we examined the process of rural-urban migration mainly to Greater Khartoum. We saw income differential was the dominant force behind the migratory movement. Rural-urban migration has not been matched by concomitant increase in urban industrial employment. And in the case of the Sudan migration to the urban areas, for some, was taken as a first step to emigration to oil rich Arab countries. This international migration of Sudanese

and its costs and benefits, is going to be the subject of discussion in the next section of this chapter.

## 5.4 International Migration

### 5.4.1 Introduction

In the previous sections we examined internal migration (rural-rural and rural-urban) in the Sudan. In this section we will be looking at the process and consequences of international migration of Sudanese mainly to Arab oil rich countries. The investigation is focussing on the cost and benefit of emigration, especially with reference to skilled Sudanese labour.

The number of Sudanese working abroad is large in relation to the labour force within the economy. The official labour department list of Sudanese working abroad in 1981 totalled 330,260. Similarly, the field Reconnaissance Mission Report (1983) on the study of Sudanese nationals working abroad estimated a total of 457,000. However, it is widely accepted that official emigration number forms only a minor of the total number of emigrant labourers. These numbers must be seen in relation to a total population of approximately 20 million, a labour force of around 6 million, and an urban workforce of little more than one million. Thus the number of Sudanese working abroad may even exceed the total urban labour force of the country.

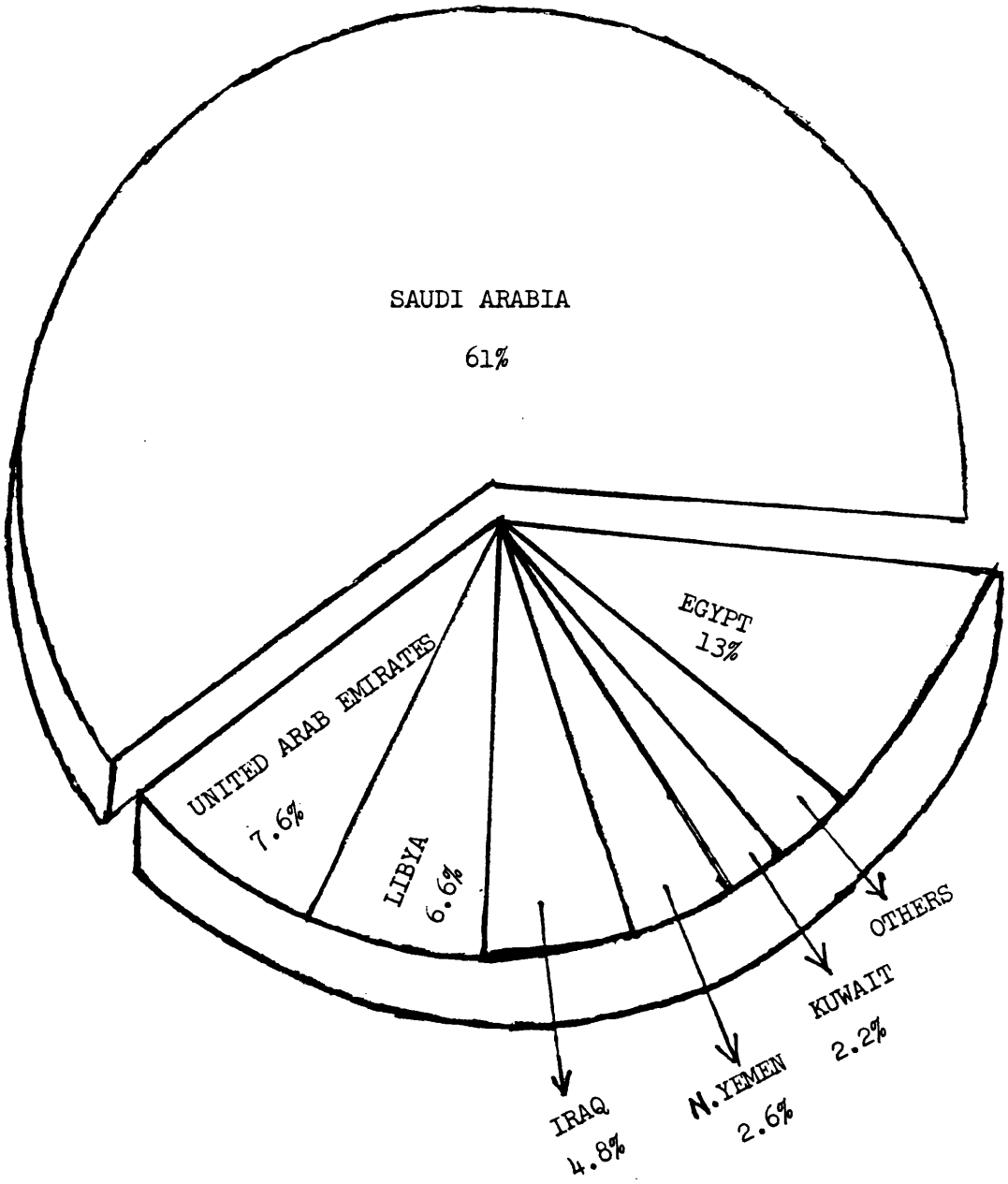
Table 5.8 Estimate of number of Sudanese nationals working abroad (SNWA) by country

| Country | Number | Percentage total |
|---|---|---|
| 1. Kuwait | 10,000 | 2.2 |
| 2. Iraq | 22,000 | 4.8 |
| 3. United Arab Emirates | 35,000 | 7.6 |
| 4. Qatar | 7,000 | 1.5 |
| 5. Bahrain | 500 | 0.10 |
| 6. Oman | 2,500 | 0.6 |
| 7. Saudi Arabia (Kingdom) | 280,000 | 61.0 |
| 8. Yemen Arab Republic | 12,000 | 2.6 |
| 9. Egypt | 60,000 | 13.0 |
| 10. Libya Arab Jamohyria | 30,000 | 6.6 |
| Total number | 459,000 | 100.0 |

Source: Field Reconnaissance Mission Report - 1983 - on the study of Sudanese nationals working abroad.

As is shown in Table 5.8 Saudi Arabia is the country with the greatest concentration of Sudanese emigrants, with 61 percent of them. Then it is followed by Egypt (13%), United Arab Emirates (7.6%) and Libya (6.6%). This reflects not only the close cultural and religious links between Sudan and Saudi Arabia, but also geographical

Figure 5.1 COUNTRY OF DESTINATION OF SUDANESE MIGRANT WORKERS



proximity and ease of entry. The annual haji pilgrimage and Omra journeys provide relatively easy methods of entering the country.

### 5.4.2 Demographic Features and Occupational Structure of Sudan Nationals Working Abroad

The structure of SNWA is characterised by being young, about 90 percent of the SNWA are within the age bracket 20-39 years as shown in table 5.9. The same table also indicates that the sex composition, generally, is dominated by males, particularly in the age group over 20 years. In general the proportion of males to females are

Table 5.9 The Structure of SNWA

| Age | Percentage |
|---|---|
| Below 20 | 3.2 |
| 20-29 | 55.0 |
| 30-39 | 34.9 |
| 40 and above | 6.9 |
| | 100.0 |

Source: Own computation based on data of the Sudan Ministry of Economic planning: Survey of Sudanese Nationals Working Abroad, 1983.

5 to 1. The rate of illiteracy of SNWA is estimated to be less than 10 per cent and the rate of high secondary (32%) and University graduates (19%) exceeds 50 per cent of SNWA.

(4) As to the occupational structure, general indicators reveal that about 15 per cent of them (SNWA), are employed in high administrative and professional posts while 25 per cent are employed in technical and semi-technical professions and 28 per cent are employed in skilled labour and 8 per cent employed in clerical and semi-clerical administrative work. Unskilled workers are estimated at about 24 per cent. [21]

Table 11.3 shows the differential between the wages presently received in Sudan by some sample migrants, and the prospective wages. The data refers to Saudi Arabia alone. The wage differential is very wide for most occupations - often being as much as 10 times the existing salary in Sudan. The implications of this is that it is difficult to see how employers in Sudan can possibly compete with the much higher rates of remuneration available elsewhere.

### 5.4.3 Impact on the Domestic Labour Market

The immediate effect such large-scale emigration has on the labour markets in semi-urban and urban Sudan is that of creating shortages of the labour force within the Sudanese economy. Both the public sector and large private enterprises within the country complain that emigration has taken the skilled workers. For example, the stock of technicians, assistant technicians and skilled labour for 1976/77 was 518,000. Between 1977/78 to 1979/80, there was an estimated addition to the stock of about 25,900 from training

institutes within the country. Between 1977/78 and 1979/80, about 15,400 persons from this category emigrated. This number constitutes about 57 per cent of the estimated addition to stock or 2.8 per cent of the projected total stock of manpower for 1979/89.[22] As experienced and skilled workers leave Sudan, they have tended to be replaced by relatively inexperienced and less skilled labour rendering lower quality services at higher unit costs. Withdrawal of technical and managerial talents has also disrupted production, thus further lowering productivity.

## 4.4 Financial and Economic measures applicable to Sudanese Nationals working abroad

In the wake of the accelerated tempo of emigration of Sudanese labour in the mid-seventies, and in view of the direct and indirect impact of this movement on the several policy measures designed to maximise the benefits which accrue to the national economy. These policy measures were designed to institutionalise and increase the flow of the remittance, savings of Sudan emigrants through the banking system. They are.

(1) Nil value import policy. By this scheme, which was in effect until 1979, a Sudanese national could obtain a 'nil value' license to import goods against foreign exchange held abroad. Imports rose during the life of the scheme from $140 million to $180 million. The scheme accounted for 12-13 per cent of total imports during the period.

(2) Custom Exemptions for migrants. In addition to the nil value license scheme, the Government sought to capture the earnings of Sudanese working abroad through the customs.

(3) Exemptions for emigrants scheme. Under this, a Sudanese national could obtain customs relief up to a limit on imports equivalent to the value of foreign accounts held in Sudanese banks on condition that the currency was remitted from outside and remained on account for six months.

(4) Preferential exchange rate. The Government gave preferential exchange rates for Foreign currency transfers to Sudan from emigrants between 1973 and 1979. In 1977/78, private transfers amounted to 46 per cent of all net services and private transfers.

It is being argued that, despite the incentives given to attract Sudanese emigrants to channel their remittances and savings through the official financial institutions; frequent government shifts in policies coupled with the depreciation in the value of the Sudanese pound vis-a-vis foreign currencies discouraged the Sudanese nationals working abroad from transferring their savings through the official financial institutions.

## .4.5 The Economic Impact of Emigration

On the negative side, emigration has caused a serious loss of trained manpower that could have made important contributions to Sudan's growth and economic recovery. In fact, emigration has caused a downward spiral - because of the loss of skilled people who could have made a contribution to economic growth, the situation deteriorates, making it less attractive for others to stay.

On the positive side, emigration has helped relieve the pressures of absolute and disguised unemployment domestically. Also, remittances from Sudanese working abroad (including nil-value imports) were equivalent to 15 to 20 per cent of Sudanese

imports on average during the late seventies, See table 5.10. Yet even this contribution was not entirely positive, for many of the imports under the nil-value license scheme were of non-essential commodities - procurement of expensive cars, electrical and electronic equipment, such as refrigerators, video sets - led to further foreign currency expenditures on spare parts, electricity and fuel.

Table 5.10

SUDAN: Flow of Emigrant Funds, 1975/76 - 1979/80

| | 1975/76 | 1976/77 | 1977/78 | 1978/79 | 1979/80 |
|---|---|---|---|---|---|
| Nil Value Import as % of Imports | 12.2 | 14.2 | 12.6 | 14.9 | 13.4 |
| Remittance and Nil Value as % of Import | 13.1 | 16.4 | 17.5 | 21.1 | 18.7 |
| Remittance as % of Net Services and of Private Transfer | 14.2 | 15.6 | 35.9 | 45.7 | 33.3 |

Source: IBRD Estimates and Bank of Sudan, 1982.

.4.6 Future Prospects

There is the probability that the number of those leaving to work abroad may decrease in the future. Recent developments in the international market for oil may affect the demand for foreign labour from the Arab oil countries. A recent World Bank

study estimated that labour demand from the Arab oil-exporting countries would continue to increase at about 4 per cent per annum until 1985 and at a slightly slower rate thereafter.[23] However, this was an extrapolation from previous trends, and did not take into account the recent slump in world oil prices or the cutbacks in the investment plans of some of the oil exporting countries. Sudan migrants are at an advantage compared with those from East and South Asia in the Sudan shares a common language and religion with the labour recipient countries. Hence, it is most likely that the number of Sudanese working abroad may remain fairly constant. This is further accelerated by the fact that, given the stagnant economic conditions in Sudan, the numbers wishing to leave will probably not go down.

There is a clear possibility that the changing pattern of demand for labour - with more emphasis on skilled and professional workers - may lead to a decline in the number of unskilled workers departing. This is related to the fact that, more than absolute numbers, the problem is that of skilled workers departing.

## 5.5 Summary and Conclusion

In this chapter we examined internal (rural-rural and rural-urban) migration and emigration in the Sudan. In general, the process, the characteristics and the mechanism of migration and the type, duration and pattern of migrant labour are discussed. The constraints on the the mobility of labour are identified as longer distance, cost of transport, haphazard recruitment methods and falling real wages due to the high cost of living. We saw that there is a high rate of internal and international migration in the Sudan. And whatever its above mentioned difficulties, we examined how migration is alleviating regional imbalances with the movement of labour from surplus areas to shortage areas.

Internal migration in the Sudan is estimated at about one million labourers per year. Approximately four-fifths of total internal migration is estimated to be within the rural sector, primarily in the form of seasonal migration for work in irrigated and rainfed mechanised schemes. In the Sudan the determining factor that influences the inter regional migration and the demand and supply of labour (in irrigated and mechanised rainfed farming) is the skewed distribution of public and private investment of both capital and expertise between the modern (central and eastern Sudan) and traditional agricultural (western) sector. This means that the demand for labour is in eastern and central

Sudan and the supply of labour is mostly from western Sudan. Hence, in this case, migration is alleviating regional imbalance through the mobility of labour from western Sudan to eastern and central Sudan.

It is also known that about 20% of internal migration is rural-urban migration mostly to Greater Khartoum and Port-Sudan. The growth in the number of population as a result of rural-urban migration has not been matched by a concomitant increase in urban industrial employment. As we will see in chapter 10, the Sudan industrial investment has been limited and overall industrial production has remained stagnant. At present there is a low capacity utilisation in most manufacturing establishments. Migration to urban areas, for some persons, because they did not get jobs, was taken as a first step to emigration to oil rich Arab countries. Even though all the migrants are not urban in origin, in all probability most of them would have resided in a city for at least some time before their departure from the Sudan. In any event they still represent a substantial withdrawal from the potential urban labour force.

On the benefit side, emigration has helped relieve the pressures of absolute and disguised unemployment domestically. And remittances from Sudanese working abroad were equivalent to 15 percent of Sudanese imports on average during the late seventies. On the cost side, emigration has caused a serious loss of trained manpower - leading to chronic shortages of skilled labour force - that could have made an important contribution to Sudan's

growth and economic recovery. The above view is reinforced by the fact that the majority of Sudanese emigrants are either professional, or skilled labour. And both public and private enterprises in the country complain that emigration has taken the skilled workers. As skilled labour leaves Sudan, they have tended to be replaced by relatively inexperienced and less skilled labour rendering lower quality services at higher unit costs. Withdrawal of technical and managerial talents has also disrupted production, thus further lowering productivity. Hence, obviously, in the case of the Sudan emigration is worsening sectoral imbalances because of the loss of skilled labour to other countries.

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# CHAPTER SIX

# SOCIO-ECONOMIC ACTIVITIES OF ORGANISED SETTLEMENT OF ERITREAN REFUGEES IN THE SUDAN

## 6.1 Background, Objective and Methodology

### 6.1.1 Introduction

Chapter five examined migration and emigration in the Sudan. The discussion focussed on how the demand and supply of labour is balanced regionally and to what extent emigration is worsening sectoral imbalances by loss of skilled labour to other countries. This Chapter contains one of the original research of the thesis. After examining the characteristics, experience and constraints of organised settlement of Eritrean refugees in eastern Sudan, a proposal is made for the establishment of organised settlement of Sudanese migrant labour as one of the employment creating strategies.

Of the more than one million refugees in the Sudan, most of them come from Eritrea and Ethiopia. In fact, of the total of refugees mentioned the majority are of Eritrean origin. The ruthless nature and the continued repressive and oppressive measures taken by the Ethiopian Government against the Eritreans have resulted in the influx of refugees from both rural and urban areas of Eritrea. The flow of Eritrean refugees in the Sudan started in 1967. Our survey shows the Eritrean refugees would like to go back to their country (Eritrea) of

origin when the conditions that forced them to leave are removed. But, given the situation in their country of origin, at present, it is likely that the refugees will remain in the Sudan for some time.

Basically, refugees are classified into two groups, those in planned settlements about 120,000 of them, and the spontaneously settled, which covers the majority of refugees. The greater number of refugees in the Sudan stay outside the planned settlement in border villages and main towns like Kassala, Gedanef, Port Sudan, Wadmedani and Khartoum. The spontaneously settled urban refugees have a very precarious existence, receive little or no assistance from the United Nations High Commission for Refugees (UNHCR), or other voluntary agencies.

As to the reasons why I included the Eritrean refugee settlements as part of my study first, settlement is seen as one of those employment generating activities. Secondly, my research work covers mainly the central and eastern part of the Sudan. Thirdly, major economic and development activities are located in the central and eastern Sudan, for instance, Gezira irrigation scheme, the mechanized agricultural sector as well as major agro-industries like Kennana Sugar factory, the Hassa-Hissa textile factory, etc, etc, are located in this area. Fourthly, central and eastern Sudan obviously attract migrant labour mainly from western Sudan. Fifthly, and perhaps very important for this chapter, more than one million refugees are settled in the central and eastern Sudan. Some people argue that the refugees are in fact

the source of cheap labour; research work on employment creation with an emphasis on central and eastern Sudan, will be incomplete without the inclusion of refugee labour.

This chapter aims at conducting socio-economic and employment activities of organised settlements (it does not include spontaneously settled refugees), for Eritrean refugees in the eastern and central Sudan. Examining in depth the skill and employment pattern of Eritrean refugees in the settlement areas and how they are affected by the seasonal nature of agricultural work. Identifying the constraints to get access to employment opportunities. And finally the establishment of settlement for Sudan migrant labour is discussed as another possible employment creation strategy.

### 6.1.2 Organised Settlements

The settlements phase signifies the stage when refugees are to be transferred from a border area or transit camps to a more permanent site, where land is allocated to them by the Sudanese Government and the infrastructure of the settlement, such as cottages, road system, water system, and primary school are financed by UNHCR. There are two basic types of agricultural settlements for the refugees. These are the land settlements and the agricultural wage-earning settlements.

Rural land settlements - each refugee family (household), is allocated 5 to 10 feddans, of rainfed

land for cultivation and the proceeds from the farming form their basic source of income. It is a marginal land. Dura and sesame are the main crops grown in these settlements.

Wage-earning settlements - the major (even only) source of income for wage earning settlements is wage labour in nearby Sudanese farms or in agricultural schemes and plantations. The seasonal nature of the employment and the low level of remuneration for wage labour are the two main economic problems that refugees in the wage settlement scheme face. The annual income of a household in the wage settlement scheme is estimated to be £Sud 150. This falls way below the poverty line income for the traditional Sudanese farmer which is set at £Sud 260.

### 6.1.3 Methodology

The field work survey involved completion of questionnaires by interviews. The field work survey was carried out in April and May 1984. The field work interviews were carried out by the researcher and two ennumerators. Both the ennumerators have completed high school, and had some teaching experience. One is Sudanese and the other is Eritrean. The Eritrean in addition to fluency in Tigrinya and Tigre was also good at spoken Arabic. For three days, the researcher gave the ennumerators seminars and explained the forms, objectives of the study and method of interviewing and collection of data and information. In order to get the confidence and

maximum response of the people selected for the survey, it was made absolutely clear that the information is meant solely for research purposes.

Two questionnaires were used for the interview, the first dealing with the family and the second to be used on the spot interviews of seasonal agricultural labourers in the semi-urban areas. The second interview is discussed on migration chapter. The family questionnaire aimed at generating data on the socio-economic characteristics and skill and work potential of the refugee. Information on the demographic characteristics and composition of the refugee's family is essential. Secondly, supply data and information on the skill and employment patterns of the refugees; the income from employment; the remittances from outside the settlement and the seasonal fluctuations of both employment and income. Also, the questionnaire generates information on the attitudes, felt needs and aspirations of the refugees.

## 6.2 Characteristics of Refugee Households

### 6.2.1 The Sample of Settlements

There are twelve organised Eritrean refugee settlements in eastern and central Sudan. And, out of the total, four settlements are randomly chosen after classification on the basis of year of establishment and the type of settlement as shown in table 6.2.

A random sample of 230 households was drawn, two from the semi-urban settlements and four from rural settlements. This was based on a random sample of 3.5

Table 6.1 Eritrean refugees settlement stratification

| Year of establishment | Type of settlement | Settlement |
|---|---|---|
| 1978 | Wage | Khashmel Girba, Awad es Sid, Feth el Roh-mar |
| 1976 | Land | Karkora, Qala el Nahal, Um Gargur |
| 1980 | Land | Abu Rakham, Wad Awad Tenedba |
| 1981 | Land | Abuda, Hwata, Um Ali |

Source: Office of the Commissioner for Refugees (Sudan) Feb., 1984.

percent of refugee households in each settlement and semi-urban towns selected (table 6.2). Given the constraints of resources and time and being aware that the limited time has to be divided between visiting factories and interviewing managers, spot interviewing of migrant labour and carrying a sample survey of refugee households; and under these circumstances it was possible only to make a sample of 3.5 percent of refugee households. It is assumed that refugee households consist of four persons.

Table 6.2 Names of Selected Settlements and Number of household samples

| Randomly selected settlements | Population | Estimated household | Household sample |
|---|---|---|---|
| 1. Fath el Rahman | 1,600 | 305 | 11 |
| 2. Um Gargur | 5,000 | 953 | 35 |
| 3. Abu Rakham | 3.500 | 670 | 23 |
| 4. Hawata | 2,900 | 550 | 19 |
| Semi-urban town | | | |
| 5. Tawawa | 10,000 | 2,000 | 71 |
| 6. Khashim El Girba | 10,000 | 2,000 | 71 |

Source: Sudan Office of the Commissioner for Refugees 1984.

6.1 Location of the Selected Eritrean Settlements

### 6.2.2 Demographic Features of the Refugee Household

Anyone who has an idea about traditional Eritrean society will perhaps wonder to what extent the Eritrean refugee has to make adjustments and accommodation in the structure of the family and the network of relationships prevalent in the traditional society. For instance, in Eritrea, the land tenure system and the pattern of inheritance were based predominantly either on communal and village or family ownership. Now, the Eritrean refugee, in addition to the breakdown of the family structure and the dislocation of the traditional community, faces an alien environment and hostile weather. Many of the refugees have lived (in Eritrea) in altitudes of up to 2,300 metres while in the Sudan they find themselves below 300 metres. Used to living in green and cool pastures it is no wonder that many refugees suffer from state of shock, insecurity and fear.

Table 6.3 shows the following important demographic characteristics. Forty-three percent of the refugees are less than 15 years old, forty-eight percent are in the prime working age group - i.e. 15-44 and 9 percent more than 45 years old. The age structure indicates that the refugee population consists mostly of young adults and children. The large number of children under 15 years of age among the refugee population implies a high dependency ratio. This young population will make special demands on the health, education and training facilities available in the settlements.

Table 6.3 AGE GROUP BY SETTLEMENT

| | <15 | | 15-44 | | 45+ | | Total |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | |
| Fath El Rahman | 42 | 50 | 33 | 39 | 10 | 11 | 85 |
| Um-Gargur | 87 | 53 | 61 | 37 | 17 | 10 | 165 |
| Abu Rakham | 49 | 43 | 55 | 58 | 11 | 9 | 115 |
| Hwata | 37 | 39 | 49 | 51 | 9 | 10 | 95 |
| Kashmel Girba | 56 | 27 | 144 | 69 | 10 | 4 | 210 |
| Tawawa | 146 | 47 | 127 | 41 | 37 | 12 | 310 |
| Total sample | 417 | 43 | 469 | 48 | 94 | 9 | 980 |

Source: Own computation based on 1984 fieldwork data.

As indicated in table 6.4 53 percent of the total population are males and 47 percent females. The biased male-female ratio is found in both urban and rural settlements as well as in every age group. If we look at the under 15 age group, 53 percent of the refugees are males and 47 percent female; 54 percent of the prime working age (15-44), are men, and 46 percent women, while 61 percent of those more than 45 years old are men and 39 percent women.

### 6.2.3 Marital Status

It is also found that 31 percent of the population are married. 62 percent of the women in the 15-44 age group are married as compared to 42 percent of the men. Among the refugees of more than 45 years old, 8 percent of the men were married compared to 45 percent of the women. The presence of a larger number of married women, particularly in the 15-44 age group, is partly explained by the mobility of the male population. Many married men have left their spouses in search of better employment opportunities elsewhere in Sudan or abroad. Some of the men are still involved in the war. These factors explain why 23 percent of the female heads of households are married.

### 6.2.4 Illiteracy Education

Table 6.5 indicates that 61 percent of the population

Table 6.4 Sex Distribution by Age Group

| | Total | | Male | | | Female | | |
|---|---|---|---|---|---|---|---|---|
| | No | % | No | % Age | % Males | No | % Age | % Female |
| 15 | 417 | 43 | 221 | 53 | 38 | 196 | 47 | 41 |
| 15-45 | 469 | 48 | 253 | 54 | 53 | 216 | 46 | 53 |
| 45+ | 94 | 9 | 57 | 61 | 9 | 37 | 39 | 6 |
| Total | 980 | | 531 | | 53 | 449 | | 47 |

Source: Own computaion based on 1984 fieldwork data.

are illiterate. Illiteracy in Arabic and English is even higher, 87 percent of the refugees are illiterate in Arabic and 92 percent in English. However, many refugees have some knowledge of broken spoken Arabic. Obviously, one can easily see that the language barrier acts as one of the constraints to refugees getting a job. And, hence, in any programme that concerns the refugees in the Sudan, if the project has to be effective training programmes that include Arabic as a second language become imperative.

Table 6.5 Level of Illiteracy

| | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Illiteracy | 519 | 52 | 461 | 70 | 980 | 61 |
| Arabic | 519 | 83 | 461 | 91 | 980 | 87 |
| English | 519 | 90 | 461 | 95 | 980 | 92 |

Source: Own Computation based on 1984 field work data.

The level of education of the refugee population in all settlements is low. As indicated in table 6.6 only 10 percent of the population have completed six years of primary education, 5 percent have completed secondary education, and a little less than 1 percent of the refugees received any form of higher education.

Table 6.6 Education

| | No. | % |
|---|---|---|
| 6 years of primary education | 98 | 10 |
| Secondary education | 49 | 5 |
| Higher education | 10 | 1 |

Source: Own calculation based on 1984 field work data.

### 6.2.5 Religion

The Muslim and Christian refugees in the organized settlements, when they co-exist in large numbers, tend to live in different parts of the settlements. The results of the survey show that 46 percent of the refugees are Muslim, 49 percent are Orthodox Christians, 4 percent are Catholics and 1 percent Protestants.

Even though classification by religion can be important as a sign of identification, one observes that religious differences do not consititute a source of conflict among the refugees in any of the settlements surveyed.

## 6.3 Vulnerable Groups

Obviously the whole refugee population is vulnerable, but, four groups of refugees may need extra attention in

the provision of assistance, and planning and management of services to the refugee community. They are refugees over 55 years old, the disabled, young children and female heads of household.

### 6.3.1 Refugees Over 55 Years of Age

The refugee popoulation is young. Older refugees account for 4 percent of the refugee population. As it is the pattern in most migration only the young and healthy become refugees. In addition, the old and disabled do not always survive the stress and hardship of refugee life.

### 6.3.2 The Disabled

As a group the disabled represent 3 percent of refugee population. The percentage of disabled in the refugee settlement varies from 4.5 percent in Kashmel Girba settlement to 1 percent in Fath El Rahman.

### 6.3.3 Children

As shown in table 6.4, 43 percent of the refugee population are less than 15 years old. The same table indicates that of the total number of refugee children, 53 percent are male and 47 percent are female. Many of the children are born in the Sudan. This number will

increase as a proportion of the total refugee population of the Eritrean refugees extend their stay in Sudan.

Young children symbolise the pressure which refugees as a group put on the already limited facilities and services in Sudan. Obviously, these young refugees will make demands on the facilities and services available in the host country. Children are also the most vulnerable to disease and health hazards linked either to malnourishment or undernourishment. They suffer the most from the poor sanitation prevalent in the settlements.

### 6.3.4 Female Heads of Households

The traditional Eritrean societies' social structure are patrilineal and patriarchal. However, as a result of the breakdown of the refugees family structure this social characteristic has changed. Female headed households have become a common occurrence among the refugee population. As table 6.7 shows twenty four percent of the household heads are women.

Of the female household heads in the settlement table 6.7 indicates also that 58 percent are registered in semi-urban areas and 42 percent in rural areas, with 36 percent in land settlement and 60 percent in wage-earning settlements.

The marital status of female heads of households is shown in table 6.8. It indicates that 22% of these women household heads are married at the time of the

Table 6.7 Female Head of Household per Settlement

| Settlement | Female head | Sample Household | Percentage |
|---|---|---|---|
| 1. Fath El Rahman (rural-wage) | 3 | 11 | 6 |
| 2. Um Gargur (rural-land) | 9 | 35 | 16 |
| 3. Abu Rakham (rural-land) | 7 | 23 | 13 |
| 4. Hawta (rural-land) | 4 | 19 | 7 |
| 5. Tawawa (semi-urban) | 15 | 71 | 27 |
| 6. Khashim Girba (semi-urban) | 17 | 71 | 31 |
| Total | 55 | 230 | 100 |

Source: Own computation based on 1984 field work data.

survey (1984), 71 percent were once married and are now divorced (33%), separated (9%) and widowed (29%). Single female households are only 7%. The married female heads of households often depend on the remittances sent by their absent husbands.

Table 6.8 Female Heads of Household by Marital Status

| | Number | Percentage |
|---|---|---|
| Married | 12 | 22 |
| Single | 4 | 7 |
| Widowed | 16 | 29 |
| Separated | 5 | 9 |
| Divorced | 18 | 33 |
| Total | 55 | 100 |

Source: Own computation based on 1984 field work survey.

As table 6.9 shows, the female heads of households are generally young; 52 percent of them are between 15 and 34 years old.

Table 6.9 Female Heads of Household

| Age | Number | Percentage |
|---|---|---|
| 15-24 | 8 | 15 |
| 25-34 | 20 | 37 |
| 35-44 | 14 | 25 |
| 45-54 | 9 | 17 |
| 55+ | 4 | 6 |
| Total | 55 | 100 |

Source: Own calculation based on 1984 field work data.

The illiteracy rate among the female heads of household is very high; in fact table 6.10 shows that 86 percent of them are illiterate. This high level of

Table 6.10 Illiteracy rate of Female Heads of Household

| | Read and write | |
|---|---|---|
| | Number | Percentage |
| Literate | 8 | 14 |
| Illiterate | 47 | 86 |
| Total | 55 | 100 |

Source: Own computation based on 1984 field work.

illiteracy is a reflection of the fact that women in general have less educational opportunities than men. Results of the survey also indicate that only 8 percent of the female-headed households had completed six years of primary education, and 4 percent had completed their secondary education.

Table 6.11 shows the occupational structure of the female heads of households, and it indicates that 32 percent of them are housewives, 28 percent earn their living by preparing and selling food and beverages, and 18 percent work as prostitutes. Many of these housewives

are dependent on remittances or the solidarity which exists between refugees for survival.

Table 6.11 Occupations of Female Heads of Households

| Occupation | Number | Percentage |
|---|---|---|
| Housewife | 18 | 32 |
| Farm labourer | 1 | 2 |
| Hairdresser | 1 | 2 |
| Food preparation | 15 | 27 |
| Unemployed | 3 | 6 |
| Prostitution | 10 | 18 |
| Trading | 1 | 2 |
| Potter | 1 | 2 |
| Tanner/Weaver/Tailor | 4 | 7 |
| Others | 1 | 2 |
| Total | 55 | 100 |

Source: Own calculation based on 1984 field work survey.

## 6.4 Skills and Employment

Tables 6.12 and 6.13 indicate the wide variety of work done by refugees in their country of origin. Obviously Eritrean refugees have skills which might be used more productively elsewhere in the Sudanese economy. However, there are certain important characteristics of

the refugee status that influence the utilisation of refugee skills.

Skills are developed and expanded in any one country in response to several market and non-market allocative mechanisms. Refugees may find that the education and skill they have are at variance with the nature of demand in the country of asylum. Such a mismatch can be qualitiative and quantitative in nature. It is, of course reinforced by the type of settlement, language problems, and the lack of mobility required to respond to regional demand differentials. Table 6.14 shows that 19% of the semi-urban and 29% of the rural refugees surveyed reported the lack of mobility as their major problem.

Skills and talents require a minimum of tools and capital in the productive process, and obviously the refugees have to leave what little capital and tools they had in their country of origin. As table 6.14 indicates 39% of the rural refugees and 40% of the semi-urban refugees considered the lack of capital and tools as the main constraint they faced. Ninety-six percent of the unemployed mechanics and electricians attributed their unemployment to the lack of tools.

At present many skills are not adjusted to the local market and are consequently not used. A process of degradation may set in over time as skills not utilised for a considerable period of time run the risk of being lost. This may be averted by rehabilitating the traditional apprenticeship system and improving access to formal vocational training facilities. In most

Table 6.12 Original Occupation of Male Refugees

| | Number | Percentage |
|---|---|---|
| Farmer | 125 | 24 |
| Teacher | 16 | 3 |
| Driver | 16 | 3 |
| Farm labourer | 21 | 4 |
| Typist/clerk | 10 | 2 |
| Trader | 10 | 2 |
| Mechanic/Electrician | 18 | 3.5 |
| Tanner | 16 | 3 |
| Spinner/Weaver | 10 | 2 |
| Bricklayer/Carpenter | 10 | 2 |
| Student | 58 | 11 |
| Shoemaker | 13 | 2.5 |
| Plumber | 10 | 2 |
| Nurse | 5 | 1 |
| Children | 176 | 34 |
| Other occupation | 5 | 1 |
| Total | 519 | 100 |

Source: Own calculation based on 1984 field work data.

instances, training programmes are necessary to upgrade the refugee skills or generate new skills to better prepare them to adjust to the needs and demands of their host country's labour markets.

While the fact that 14 percent of those refugees who were farmers in the country of origin are farming at present can be explained by the problem of limited access to land, others point to serious constraints in labour market information and access to markets. For example, the 23% unemployment rate for teachers and 24% for typists can be partly attributed to the language barrier. On the other hand, it can be contended that given the demand for skilled labour, with a minimum of retraining such skills can be fully utilised with the settlement and the semi-urban labour markets.

While the urban markets suffer from shortages of skilled labour in areas like electricians, auto-mechanics and building trades, 15% of the first category, 22% of the second and 24% of the third category remain unemployed. The restrictions on the movement of refugees, particularly those in rural settlements continue to be the major constraint on their access to employment opportunities. In the case of refugees the rural-urban labour mobility is institutionally restricted. Despite the fact that none of the existing laws regulate or prohibit the movement of refugees the security authorities are controlling it and assuming the responsibility of issuing travel permits. As the freedom of movement of labour does not apply to refugees only the suburban settlements of Khashim El

Girba and Tawawa have access to the employment opportunities in the urban labour markets. These two communities are among the potentially most viable settlements. The labour force in the rural settlements, whether skilled or unskilled, have no choice except to depend on seasonal agricultural employment.

Table 6.13 Original Occupation of Female Refugees

| | Number | Percentage |
|---|---|---|
| 1. Farmer | 6 | 1 |
| 2. Teacher | 9 | 2 |
| 3. Housewife | 198 | 43 |
| 4. Food | 7 | 1.5 |
| 5. Typist/Clerk | 9 | 2 |
| 6. Student | 41 | 9 |
| 7. Hairdresser | 2 | 0.5 |
| 8. Spinner/Weaver | 9 | 2 |
| 9. Trading | 6 | 1 |
| 10. Nurse | 2 | 0.5 |
| 11. Children | 170 | 37 |
| 12. Other occupation | 2 | 0.5 |
| Total | 461 | 100 |

Source: Own computation based on 1984 fieldwork data.

Table 6.14 Major constraints to access to employment opprotunities

| Constraint | Semi-urban | Rural |
|---|---|---|
| No permits | 10 | 11 |
| No employment | 31 | 21 |
| No tools | 4 | 6 |
| No capital | 36 | 33 |
| Restricted movement | 19 | 29 |
| Total | 100 | 100 |

Source: Own computation from 1984 fieldwork data.

Table 6.15 Percentage Distribution of Type of Employer

| Employer | Semi-urban | Rural |
|---|---|---|
| | % | % |
| Sudanese | 48 | 49 |
| Self-employed | 46 | 44 |
| Refugee | 4 | 4 |
| Others | 2 | 2 |
| Total | 100 | 100 |

Source: Own calculations based on field work data (1984).

Table 6.15 shows that of the refugees surveyed 45 percent of those presently working are self-employed. The same table also indicates that those who work with the Sudanese represent another 48 percent, with the major employer in the rural areas being the agricultural sector providing seasonal employment in both the mechanized rainfed area around Gedaref and the irrigated schemes of Suki and New Halfa. Most of the self-employed as well as those employed by the Sudanese in semi-urban areas operate within the informal sector.

## 6.5 Emigration or Resettlement of Refugees

The outwards movement of refugees for emigration or resettlement has important consequences both for the host country and for the refugee community. Resettlement programme and the out-migration of refugees contribute to a 'psychology of departure', which created additional strain on the refugee communities by raising the level of expectation and increasing tensions which are negatively reflected upon the solutions proposed by the host government. The young, the educated, the highly skilled and the affluent refugees are mobile within Sudan and internationally. Many have already left Sudan. Also, these categories of refugees are the target groups of all resettlement programmes. Thus, while the number of refugees chosen for settlements is quantitatively insignificant, it qualitatively amounts to skill and brain-drain. The departure of skilled and qualified

refugees effects the quality and availability of many vital services in the refugee communities.

However, resettlement usually results in remittances being sent to families and relatives. In most cases this represents an important source of income. In the household survey remittances amounted to 17 and 18 percent of urban and rural income respectively. 75 percent of remittances received in rural settlements came from urban areas within the Sudan and the remaining from abroad. In contrast more than 96 percent of the remittances received in urban areas came from outside the Sudan. Of the refugee households receiving remittances these represent on the average 34 percent of the total income.

## 6.6 The Economic Viability of Eritrean Refugee Settlements

Major determining factor in employment creation or opportunities is the type of settlement open to the refugee. Investigating and assessing the viability and weakness of the present settlements is essential, perhaps for both future settlements and the introduction of income generating activities in existing ones.

### 6.6.1 Rural Wage-Earning Settlements

These kind of settlements schemes are established on the assumption that refugees will find employment as agricultural wage labourers in the nearby schemes, for instance Fath El Rehman settlement near Suki scheme. In

the preceding paragraphs problems and difficulties refugees face on complete dependence on one source of income are identified.

(1) The seasonal feature of demand for labour characteristics of agricultural production and the limited opportunities for non-farm employment in the slack season results in a very high rate of underemployment. The survey we conducted shows that underemployment amounts to 51 percent of the person years of the economically active population. And table 6.16 shows that average annual income per adult of rural wage earning settlement is only £Sud 129.

(2) The complete dependence on seasonal agricultural employment not only results in low income (see tables 6.16 and 6.17), but also means a complete reliance on a very unreliable income. Two major unreliabilities and uncertainties are involved. First, income uncertainty and fluctuations feature of the contractual mode of the task system. The total number of days employed in the season fluctuates according to the demand for labour. These variations are dependent upon rainfall, as well as supply of labour from within the region and migrant labour from other parts of the country. The second element of risk is price uncertainty. As more than 80% of the wage is paid in cash the real wage fluctuates with the price of the staple (dura), while the decrease in demand for labour results in reduced employment and hence lower income; a bad season usually means higher prices for the staple food, and thus a lower purchasing power for income earned.

Refugees living in these settlements will remain vulnerable unless an effort is made to diversify sources of income.

Table 6.16 Average Annual Income per Adult by Type of Settlement (in Sudanese Pounds)

| Type of Settlement | £Sud |
|---|---|
| Land Settlement | 205 |
| Rural wage-earning | 129 |
| Suburban wage-earning | 295 |

Source: Own computation based on my field work data, 1984.

### 6.6.2 Suburban Wage-Earning Settlements

Refugees in these settlements are in a relatively better position. They have greater access to the more dynamic urban labour market. For instance, even though 68 percent of economically active population in Khasham El Girba are engaged in farm employment, 54% of the income generated in that settlement comes from non-farm employment. A wide variety of occupations ranging from casual labour in the dry season to food sales by the Khartoum - Port Sudan roadside provide a major source of income for refugees in this settlement. Located near Girba and Gedaref towns respectively Khashma el Girba and Tawawa

present more income generating activities than other rural settlements. Other activities like casual labouring and domestic work generate considerable income to supplement the seasonal income earned in agricultural labouring. And that is why the average annual income per adult of suburban wage earning reaches £Sud 295. It means that this annual income compares more favourably than either the annual income of rural wage-earning or annual income of land settlement, as is shown in table 6.16.

### 6.6.3 Land Settlements

Land settlements are based on the provision of five to ten feddans of a plot of rainfed land to each refugee household. Table 6.16 indicates that average annual income per person of land settlement is £Sud 205. Food rations supplied by the World Food Programme (WFP) are gradually phased out over two years and the refugee settlers are expected to reach self-sufficiency in dura by that time. Why is self-sufficiency at this stage an unattainable target?

(1) Rural land settlements situated in marginal rainfall areas like Um Gargur will continue to face a high risk of failure.

(2) The smallholding size of five to ten feddans per household and also being marginal land, are the major constraints on reaching self-sufficiency in dura. The practice of a crop rotation including fallow land cannot be followed and consequently the continuous deterioration

of soil fertility and thus declining yields will further aggravate the situation.

(3) Due to the seasonal nature of agricultural activities and the lack of other forms of off-farm employment during the slack period; there is a high incidence of underemployment amounting to 41 percent of the person years of the economically active population in the land settlements.

(4) Even in the short run with fairly fertile soils, it is evident that refugee households can only reach self-sufficiency in dura under the assumption of high yield and ten feddan plot. An average household of 5.6 members completely relying on household labour for harvesting and threshing can only reach self-sufficiency by maintaining a yield at least 2.7 sacks feddans which is 15% higher than the average yield in the Gedaref area.

## 6.7 What Can be Done?

Securing productive employment can take the form of self-employment in farming or trade. In this case it requires three essential and complementary sets of inputs; fertile land with sufficient and reliable rainfall for crop production; the skilled labour to achieve a high level of productivity and most importantly an efficient vertical system of assembly and distribution of both inputs and the final product.

An alternative form of productive employment is wage earning in the different sectors of the economy inside

and outside the settlements. Here, two important issues are involved. The elimination of barriers to entry into the labour market. These barriers take the form of restrictions on mobility and the need to have business and work permits, licences, etc. Access to regular and secure employment in order to ensure regular and sufficient incomes and minimise underemployment.

The determinants of economic viability of settlements are (a) size and (b) location.

(a) Size - the viability of the internal market, within the settlement is positively correlated to its size. Whilst a viable size entails diversity in skills, it also generates the necessary demand for goods and services within the settlement.

(2) The per capita fixed cost of infrastructure and services (health, transport links, water, education, electricity, and administration), varies inversely with size. Most settlements are just too small for such services to be provided at a reasonable cost. Size is not in proportion to the available infrastructure (say Gedaref), resulting in pressure on the limited facilities which leads to their deterioration.

(3) On the production side, larger settlements will allow for full realisation of economies of scale in enterprise organised at the settlement level.

Location has also an important bearing on the viability of settlements.

(a) It determines the amount, type and quality of physical resources available for exploitation by the

settlers. This is particularly important for crop and livestock production.

(b) Location also influences access to markets and services as well as employment opportunities. Most settlements are located in remote areas. A striking characteristic of the settlements when perceived as a group is their isolation from each other and their remoteness from the main urban centres and transport network. For most of them accessibility is a major problem for part of the year. Feth el Rahman and Awad El Sid are located close to the Suki Agricultural Corporation in the Blue Nile Province. The closest urban area is Sennar - 25 km away. Um Ali and Abomda lie respectively 18 and 12 kilometres, southeast of Showak, on the east bank of the Athbara - Setit rivers. The river is not fordable during part of the rainy season. Um Gargur and Korkora are situated respectively 15 and 20 km from Showak and are not accessible in the rainy seasons. Abu Rakham and Wad Awad are located close to the Rahad scheme. The settlements can be reached only with much difficulty during the rainy season. The major exceptions are the two suburban settlements of Tawawa and Khashm-el-Girba situated on the Port-Sudan - Khartoum road network.

From a general perspective the performance of the settlements will be adversely affected in the short run by the present condition of the Sudanese economy, a high debt burden (10 billion dollars), high inflation rates (45%) and low productivity (both agriculture and industry)

and the chronic shortages of basic commodities. Of more significance is the state of the local economy where the settlements are located. Locating refugee settlements in economically depressed areas like Suki will only mean limited opportunities for refugees and additional problems for the local communities.

Until now plans are conceived and decisions are made by the Government of Sudan, UNHCR, and voluntary agencies, refugees themselves (as if they do not exist), their ideas and perceptions, are either not considered or ignored throughout the decision making process in the three phases of relief, rehabilitation and development. Full participation of refugees in the decision making prodess is paramount. Grass-roots participation is a pre-requisite for healthy community development in the settlements.

The discussion above concentrated on one hand, on the identification of the characteristics and skills of Eritreans, and on the other hand on the constraints (lack of mobility of labour, lack of tools and capital, language barriers etc, etc,) they face in their attempt to look for a job. Obviously, we have seen that there are some skills and talents among Eritrean refugees, and these skills and talents can be tapped both for the advantage of the refugees as well as for the growth of the Sudanese economy; assuming that someone makes an attempt to reduce or eliminate the bottlenecks mentioned above.

## 6.8 Settlement of Sudanese Migrant Labour

In this chapter we have examined and analysed, in detail, settlement, another possible employment creation strategy, with the experience of organised settlement of Eritrean refugees in the eastern and central regions of the Sudan. In spite of many weaknesses and problems that organized settlements face mainly related to organization, viability and mobility of refugee labour and hence the skills of refugee labour are not fully utilised; we argue there is a good prospect for employment creation by means of state sponsored settlement of migrant labour.

There is an overall agreement that there is a large degree of underemployment (under-utilisation) of available labour nationally which poses a very serious socio-economic problem for the Sudan. The employment problem in the Sudan is the problem of imbalance between the supply of labour (mainly western Sudan) and the demand (major economic and development activities are located in central and eastern Sudan).

In the short-run, the suggestion is not to rush into capital intensive technology but to increase the mobility of labour and to provide adequate incentives for labour to seek work. Such incentives include attractive wages, and other employment conditions, including the provision of return transport from places of origin to places of work, living accommodation, essential food articles, health facilities and drinking water. Hence, mobility of

labour should be facilitated to enable surplus labour to seek employment wherever it is available. And the organisational aspect of massive seasonal labour movement in the Sudan deserves national recognition. At present the recruitment methods are uncoordinated and haphazard.

For the medium and long run policy we assume that Sudan sticks to its core development strategy and policy, that is, maximisation of output, through developing the modern irrigated and mechanised agricultural sector and modern industrial sector in the central and eastern Sudan, thereby, ignoring the small traditional agricultural sector. Then we argue, the mechanism of labour migration has a vital role to play in allocating to labour some of the returns from modern irrigated and mechanised agricultural sector. That is why the Sudan has an unusually high rate of internal labour migration, estimated to be about one million labourers a year. About 80 percent of them are rural-rural migrants. A migrant labourer comes from as far as Kordofan and Darfur, a distance of 1,100 kilometres. In fact, more than half of migrant labour comes from Kordofan and Darfur. The proposal here is the possibility of gradually bringing (moving) labour closer to capital and land through voluntary organised settlement of migrant labour.

The above proposal is reinforced by recent developments, even the tenants themselves are now resorting to off-farm work and regard work in the tenancies of secondary importance. Originally, the

tenants' family in addition to supplying family labour had the role of importing (recuiting) above 50 percent of migrant labour. But recently because of their growing lack of interest in working in the tenancies themselves, their role in recruiting migrant labour is diminishing due to their developing off-farm economic interest. Then, someone has to fill the gap of recruitment, otherwise firstly the jobs of thousands of migrant labourers would be in jeopardy and secondly production of cash crops (cotton, groundnuts etc,) would drastically fall.

Settlement of migratory labour - many labourers who come from western part of (drought stricken area) the Sudan, came from far distances and may like to settle down in other areas where there are better prospects of continued employment. A scheme of incentives for such voluntary organised resettlement of rural population may be worked out. It may inlcude financial assistance for the transfer of whole communities from one location to another may entail much less problems of adjustment. Hence, planned settlements may provide the best solutions from the labour problems created by the imbalance between geographic distribution of labour (western Sudan) and its demand (in central and eastern Sudan)

The Government has to move beyond encouragement to actively assisting migrant labour to settle. And at the same time learning from the weakness and experiences of organised settlements of 120,000 Eritrean refugees in the Sudan. The major issues involved such as (a) the size

of holdings and tenancies must be decided in such a way as to ensure full employment and a high level of family labour utilisation (b) new communities with all the basic necessary civic amenities must be planned to ensure a reasonable level of self-sufficiency and (c) selection of methods of providing settlers with the working capital, basic equipment and credit facilities until they become self-supporting.

After examining the experience and weaknesses of organised settlement of Eritrean refugees, this chapter focussed on the establishing settlement as one of the solutions to Sudan's employment problem. As part of the general objective of encouraging employment creation in the Sudan chapters 7 to 10 examine and investigate the possibility of applying simultaneously optimal choice of technique, full capacity utilisation and choice among various shift work patterns in 19 Sudanese agro-firms. In the final part of the thesis integrated results of estimation of the magnitude of employment creation, through organised settlement of Sudanese migrant labour and in Sudan agro-firms, would be made.

Appendix (6.1)

## The Survey Forming the Basis of the Study of Socio-Economic Activities of Organised Settlements of Eritrean Refugees and Seasonal Agricultural Labourers in the Rainfed Mechanised Farming of the Sudan

### The Survey

Field work survey interviews were conducted by the researcher and two assistant ennumerators in March and April 1984. Previously, the researcher briefed the ennumerators about the objectives of the study, questionnaire forms, and method of interviewing and collecting of data. Two questionnaires were used from the interview. The first dealing with the refugee household family and the second used on the spot interviews of seasonal agricultural labourers in the rainfed mechanised farming. In all 245 refugee households were visited resulting in 230 usable completed questionnaires. 7 forms could not be used becuase of incomplete and inadequate information. And 9 refugee households refused to co-operate. Similarly, on the spot interviewing of 125 seasonal agricultural labourers in the rainfed mechanised farming, produced 121 usable completed questionnaires.

### 1. Sample

A sample of 4 out of 12 Organised Settlement was selected by the researcher on the basis of the following criteria: year of establishment and the type of settlement. By type of settlement include land 3 and wage 1. By year of settlement see table 6.1. The randomly selected settlements are; (1) Fath el Rohman (2) Un Gargur, (3) Aba Rokham and (4) Hawata. On the spot interviewing

of the seasonal agricultural labourers in the rainfed mechanised farming was carried out in the semi-urban towns of Tawawa, Khashim el Girba and near Gaderif.

2. Interview

In each case, the respondent was informed that the purpose of the survey was firstly and mainly to conduct socio-economic and employment activities of organised (Eritrean refugee) settlements, and try to identify the employment problems they face. And secondly, examine the features and trends in the rural labour market in the rainfed mechanised farming area of Eastern Sudan. In order to get the full confidence and maximum response of the refugee household and reasonal agricultural labourers selected for the survey, it was made absolutely clear that the information is meant solely for research porposes. Average duration of interview was 2 to 3 hours.

3. Size of Problems Encountered

The main problemsthat the researcher encountered while on field work research are related to transport, and restriction of movement.

There is a chronic transportation problem in the Sudan. You first start to face the tranportation problem in Khartoum itself. My original plan was to travel by buses within Khartoum,to and from government departments, University of Khartoum, and other relevant institutions for the first ten days. I found it was not possible to use buses, hence, I was forced to using taxis;

of course it meant unanticipated drastic increase of the anticipated transport cost. Transportation and travel outside Khartoum obviously is more difficult, and this is also more compounded by hostile weather and checks in buses. There is a restriction of free movement for foreigners wanting to travel outside Khartoum, unless he (she) gets permission. To secure permission takes some time and that delays ones plans and programmes.

Refugee Household Questionnaire

1. Settlement

   1.1 Name of Settlement .....

   1.2 Type of Settlement — Wage — — Land —

2. Population

   2.1 Population planned .....

   2.2 Actual population .....

3. Household Sample

4. Name of persons interviewed .....

5. Demographic Data

   5.1 Religion — Muslim — — Christian —

   5.2 Sex distribution Male ... Female ...

   5.3 Age distribution

   less than 15

   15-49, 50+

6. Household

   6.1 Average size of household.

   6.2 Average number of children.

   6.3 Average number of non-relatives.

7. Literacy and Education

7.1 Literacy rate (mother tongue)

15, 15-49, 50+

7.2 Literacy rate - other language

15, 15-49, 50+

7.3 Education attained

primary, secondary

8. Vulnerable group, % population

8.1 Female headed household .....

8.2 Children 5 years old .....

8.3 Over 55 years .....

8.4 Disabled .....

9. Economic data

9.1 Estimated yearly income (Ls) .....

9.2 Economically active (% popul.) .....

9.3 Unemployment and underemployment (% of economically active) .....

9.4 Of economically active engaged in farming .....

10. Rank the various constraints to access to employment opportunities.

1. Permit ..... 3. Tools .....

2. Capital ..... 4. Restricted movement .....

11. If you wish to give comment or any other relevant information affecting your life in the settlement or any suggestion in your opinion that can improve life there please state briefly.

Seasonal Agricultural Labourers Questionnaire

1. Place of birth .....
2. Current.home .....
3. Sex distribution Male ... Female ...
4. Age distribtuion. Less than 15, 15-49, 50+.
5. Land areas cultivated in 1983 by respondents and their household
   .....
6. Determining factors pushing labourers to seek labouring jobs
   .....
7. Average wage rates per week or month .....
8. Rank the various problems and difficulties you face .....
   a) transportation .....
   b) no payment .....
   c) delay in payment .....
   d) Housing .....
   e) Food delivery .....
   f) Others, please Specify .....
9. If you wish to give comment or any other relevant information affecting your work in the rainfed mechanised farming please state briefly.

# CHAPTER SEVEN

# CHOICE OF TECHNIQUE IN LEATHER MAKING INDUSTRY

## 7.1 Introduction

Chapter six gave results of one of the original research survey, after discussing the experience and difficulties of organised settlement of Eritreans, the establishment of settlement as one of the Sudanese employment creation strategy was proposed.

The search into employment creation strategy continues with the presentation of the results of another original research survey, that is, the choice of technique in 19 agro-firms in the Sudan; and it is examined in chapters 7 to 9. This chapter gives a brief survey on the choice of technique and then examines choice of technique in three tanning plants in the Sudan.

## 7.2 Definition of Appropriate Technology

There is no general agreement on the definition of appropriate technology. Various concepts of appropriate technology have been formulated and they often refer to different aspects of the problem of under-development and unemployment. Here, a brief reference to the influential approaches in this field is made.

Morawetz (1974) defined "appropriate technology as the set of techniques which make optimum use of available

resources in a given environment. For each process on a project it is the technology which maximises social welfare if factor prices are shadow-priced."[1] For Pickett (1979) an appropriate technology "is the one which produces a specified product at a lower unit cost than any available alternatives and at something like the world price for the product when inputs are valued at their true opportunity cost, and hence in neo-classical thought at prices which permit full employment of all factors."[2]

Reddy defines appropriate technology "as one which advances the following objectives, (a) the satisfaction of basic human needs in order to reduce inequalities between and within countries; (b) endogenous self-reliance through social participation and control and (c) harmony with the environment."[3] This basic need approach to appropriate technology is often associated with a preference with techniques that generate larger (with emphasis on current) employment.

Another viewpoint adopted by Mrs. F. Stewart broadens the question of choice of technique to include the choice of 'appropriate product'. "These are defined as products involving labour-intensive methods of production, and products which do not over-kill in relation to the needs of developing countries."[4] In Mrs. Stewart's definition appropriate technology is one that is labour-intensive and is associated with small scale production of goods which meet the needs of developing countries.

Actually, the four definitions of the choice of technique are, directly or indirectly, related in the sence that by 'appropriate' they mean factor propositions that are roughly in line with the overall factor available in an economy. The poorer the less-developed country, the less capital (physical and human) relative to labour we expect to find and hence the more labour-intensive the 'appropriate' factor proportion would be.

What then is the link between the choice of techniques of production and employment creation? If we use the simplified two-factor model, techniques or production is taken as particular combinations of investment (machinery) and labour that can make a given product. Then, assuming that there is a range of such techniques available each defined by different amount of investment per labour, the economic problem is to specify the optimal technique assuming that we know the cost of labour and the cost of capital. The link to employment creation is that if there are unemployed and under-employed labour, techniques which use relatively little scarce investment capital per labour (i.e. labour-intensive one) may become socially desirable or optimal from the social point of view.

The next section examines the conceptual and theoretical discussion on the choice of technique by developing the neo-classical approach and then identifies the main weakness and short comings of the simplified two-factor model.

## 7.3 Theoretical Note on Choice of Technique

Development of the neo-classical approach in application to less-developed countries (LDCs) has been divided between two schools of thought; the first maintains that LDCs should choose labour-intensive techniques in order to make efficient use of abundant factors (labour) and economise on their scarce factor (capital); but the second insists that investment should be a criterion for choice of technique which tends to favour a capitalist-intensive technology. The discussion below follows the first approach.

The neo-classical approach to the choice of technique is based on two characteristics of techniques - labour and investment requirements - and regards the question of choice of technique as consisting of choosing between techniques of differing labour and investment intensity. The relative price of labour and investment is regarded as the determinant of this choice with that technique being selected that maximises profits, given the relative price and the substitutability between capital and labour. Variations in capital-labour ratios are the standard response to variations in factor prices. Assuming that capital and labour are homogeneous, optimal production strategy would substitute labour for capital if the relative price of labour were to fall. From this it follows that if a given (planned) output, represented by isoquant SS in Figure 7.1 of a particular commodity were to be produced in two different locations, with different

factor-price relatives, then the capital-labour ratio (given by the slope of OA) in the location where labour is relatively expensive would be greater than the capital-labour ratio (given by the slope of OB) in the location where labour is relatively cheap. In profit-maximising equilibrium in a two-factors model the ratio of marginal products of the two factors is equal to the factor-price ratio, so that M and N in Figure 7.1 represent the respective equilibrium positions.

Given complete mobility, the position depicted in Figure 7.1 could not persist. Capital and labour would both move in search of higher returns until (ignoring transport costs) relative factor prices were the same in both locations and production was characterised by a common capital-labour ratio. In fact there are many barriers to factor movement particularly labour mobility. Different capital-labour ratios could therefore reasonably be expected in different sub-markets, with the gap being greatest between the relatively most capital and the relatively most labour rich regions respectively. In keeping with this expectation low wage countries would use labour intensive and high wage countries capital-intensive methods of production. In practice, however, this expected very wide spread of capital-labour ratios in any given industry is not generally observed as between developed and developing countries. In practice in many LDCs, such as the Sudan, capital-intensive nature of plants and machinery are installed.

Figure 7.1 Change in Technology

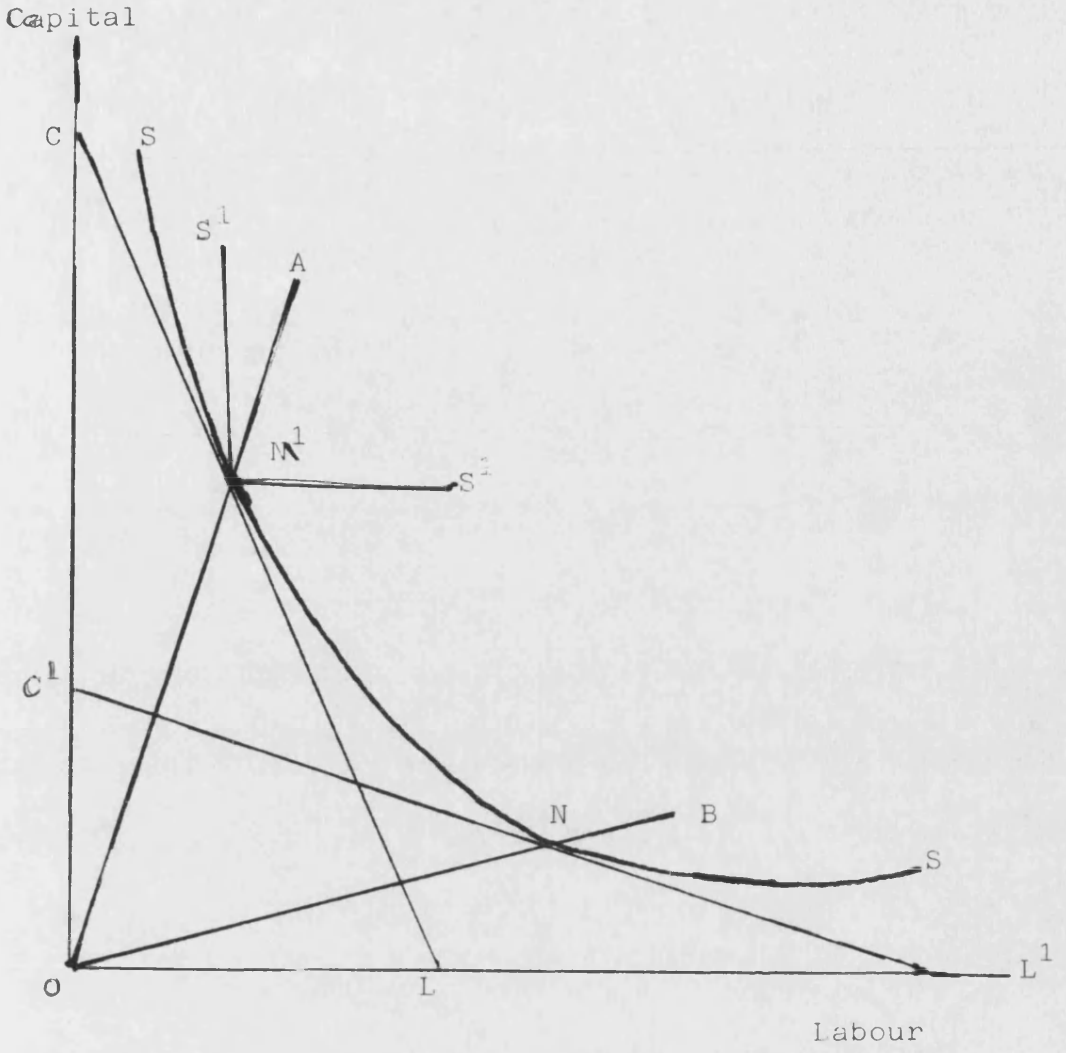


Figure 7.1 shows the investment decision as comprising a fusion of independent economic and engineering elements. The contrast between theory and practice (expectaion and reality) has been given both technological and economic explanation. The technological explanation involves completely rigid technology in the face of which difference in relative factor prices would be irrelevant. If this explanation were valid, the production isoquant SS in Figure 7.1 would be replaced by the isoquant $S^1MS^1$. The economic explanation is, basically, that factor prices are distorted in developing countries, giving unintended

encouragement to the use of capital-intensive techniques. Among reasons adduced to support this are overvalued exchange rates, generous investment allowances and other policy measures which artificially reduce the price of capital and minimum wage laws and pressures resulting from the establishment and growth of urban trade unions which increase the price of labour. Here, it is related to with an empirical research work on 19 agro-firms in the Sudan, which suggests that there is a scope for technological choice in the tanneries, textiles, wheat milling and groundnut decorticator plants in the Sudan. And that the techniques actually used in the Sudan could have been replaced by more labour-intensive technology. Hence, the technological explanation should not be over stated.

We have examined above the neo-classical approach to the choice of technique and this involves only a substitution of one factor for the other, that is, a change in technology. But one has to make clear the distinction between a change in technology (figure 7.1) and technical change (figure 7.2) which involves a shift in the production function due to technical progress. This implies that after the technical change the same output can be produced with less of each factor.

Figure 7.2 can be used to show the case of factor substitution due to technical change. This figure depicts two isoquants for production of the same output of the same good before and after some change in technology of production is introduced. Let isoquant q

represent the possible combinations of factors, labour and capital, that can be used to produce output q prior to the innovation. Given market prices of these resources, a cost-minimizing firm would employ combination T, at which isoquant q is just tangent to isocost curve $C^1$. After the innovation is introduced, however combination T no

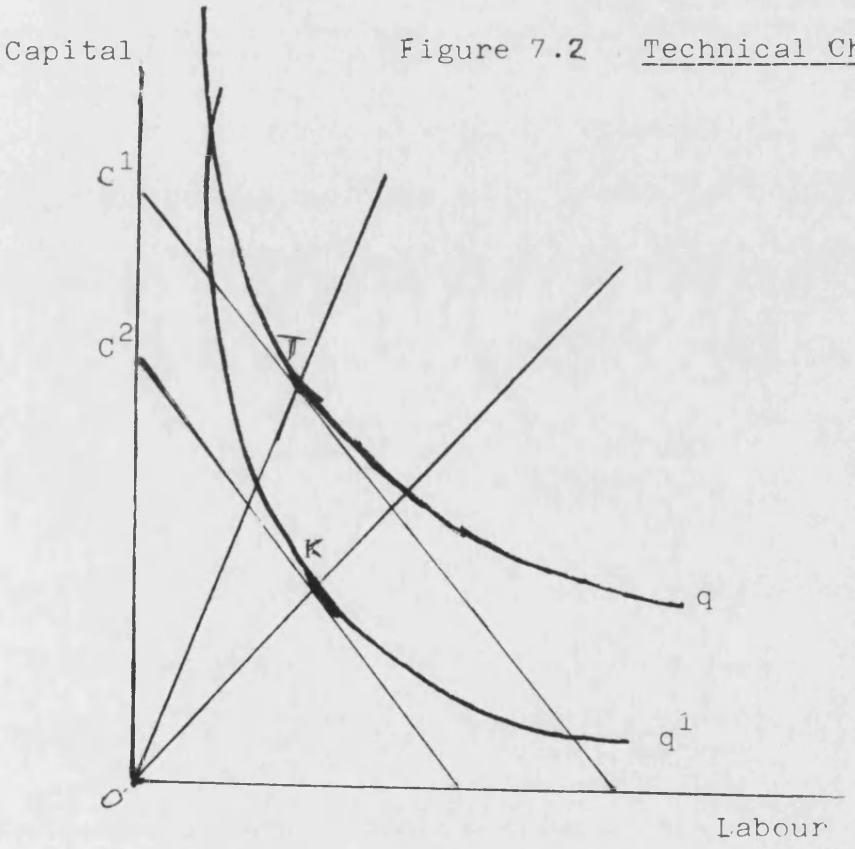


Figure 7.2 Technical Change

longer produces this output at lowest cost. The isoquant associated with this output is now $q^1$, and the rate of technical substitution no longer is equal to the price ratio at T. The factor combination that now minimizes the cost of output q along the new isoquant $q^1$ is K which is producible at a lower cost $C^2$.

The two-factor model of the neo-classical approach to the choice of technique is criticised for being over simplified. A common one is against the assumption that there are only two factors of production (that is, capital and undifferentiated labour) and ignores the others, inputs such as scale of output, skilled labour, nature of products, infrastructural requirements etc, etc.[5] The second criticism is related to the critical determinants of choice of technique. The neo-classical approach assumes that the relative price of labour and investment is regarded as the only determinant of the choice of technique. But many analyses of technical choice made in the past suggest that the relative price of capital and labour was only one among a number of determinants of the choice of technique.[6]

Having discussed the basic theoretical, conceptual aspects of the choice of technique and the weaknesses that arise when dealing with the simplified two-factor model, we now proceed to the main empirical studies on the choice of technique.

## 7.4 Empirical Discussion on the Choice of Technique

The development of neo-classical analysis in application to LDCs in its dealing with the empirical efforts to determine the possibilities for factor substitution in manufacturing concentrate on three methods of study; first, econometric estimate of the

elasticity of substitution, second, studies demonstrating substitution possibilities but not establishing their quantitative importance and third, the micro-economic studies combining engineering and economic analysis of production.

Many analyses before 1970 using LDCs data, usually from industrial censuses, attempted to measure the degree of substitutability between capital and labour. If the logarithm of value per worker is regressed against the logarithm of the wage the coefficient of the logarithm of the wage is an estimate of the elasticity of substitution. Most studies use this form. Elasticities significantly above zero were found for many industries, suggesting considerable scope for factor substitution. Although encouraging, such results could not by themselves constitute the basis for the efforts needed to induce more labour-intensive production, as we will see below its estimation problems and shortcomings.

The problems of these studies, in concepts, data and econometric techniques , have been reviewed by a number of authors.[7] The shortcomings among others include all labour and all capital are assumed to be uniform and to be the only factors of production. The assumption of competitive markets is not true, all firms may not be using the same technology, the CES form may not be the correct one, the level of capacity utilisation is usually not held constant, time-series studies may not include lags properly, and cross-country studies may not use the correct exchange rate.[8]

In the light of these theoretical and empirical problems inherent in the purely econometric studies; recently interest and efforts have shifted into investigating microeconomic exploration, of factor substitution studies using both the engineering information and data obtained from visits to plants in LDCs. This data is then used in two different ways. The first method, the Strathclyde studies relies on the construction of synthetic isoquants. By using data obtained from individual plants in a large and varied set of countries, as well as engineering information, a set of alternative techniques is identified for each stage in production. By assuming that the choice at one stage does not limit the range of choice in preceding or succeeding stages, synthetic technologies consisting of known techniques are constructed. The optimal technology is found by computing the present discounted value (PDV) of operations for each of the efficient techniques for each of the efficient techniques.[9] I am not using the Strathclyde method in my computations because my data are not disaggregated to the sub-process level. The second method measures the inputs that operating plants require to produce a well-defined product in a country or group of countries.[10] Given the observed inputs of labour, capital and materials, a set of efficient techniques can be delineated in the sense that each technique is a point on an isoquant.

My quantitative data covers whole production lines, it is not disaggregated to the sub-process level. In computing and analyzing the micro economic choice of

techniques in 19 Sudanese agro-firms I am using a similar approach to the above second method micro-economic studies. My approach to the question of choice of technique is to examine whether those that are actually in use for making various types of product (tanneries, 3, textile spinning, 3, textile weaving, 6, wheat milling, 3, and groundnut decorticators, 4) in the Sudan are economically efficient in relation to one another. Hence, the first question we ask on all chapters on choice of technique is whether the techniques within each group are efficient in this sense. The second step in the analysis is to examine total unit cost of production and employment implication with the various techniques available.

## 7.5 Analytical Methods

The data for the micro empirical studies of the choice of technique were collected through visits to 19 agro-firms in the Sudan during the fieldwork phase of the study in early 1984. The quantitative data covers the whole production process. Our data is not disaggregated to the sub-process level. This means that due to data limitation at sub-process level of our survey we cannot look at alternative technologies at sub-process level; but instead we look at alternative technologies at whole production process level. The main items of the quantitative data are;

(1) Labour input per shift and wage rates. These data were obtained from factory visits. It was possible

to break down labour inputs into skilled and unskilled labour. The cost comparison are based on market wage rate (1982/83 prices) - the ruling wage rate in the Sudan modern sector.

(2) Rates of output for the production. They are also based on the actual operation of the production process generally obtained from yearly production figures (1982/83) in the factories visited. This means that output per day is actual and not capacity.

(3) Capital costs. All capital costs are calculated as if we were making a choice of investing in one or the other of the techniques currently used in each firm. We used the 1982/83 replacement costs for buildings and machinery. Annual capital costs were obtained by using an annuity formula, based on assumed 10 percent rate of discount and assumed economic life. Building costs were also obtained from the factory visits. Building annual costs are based on rate of discount of 10 percent throughout and an assumed economic life.

Assumptions

(1) Product differentiation within each group of technologies are assumed to be sufficiently small to be ignored in the comparison.

(2) In production we have assumed actual capacity utilisation to be single shift work.

(3) Uniform market wage rate.

(4) There will be certain costs that can be regarded

as invariant accross techniques - general management, supervision and clerical staff.

## 7.6 The Survey Questionnaires

The survey forming the basis of the micro empirical studies of the choice of technique and optimal utilisation of existing industrial capacity in the agro-related industries of the Sudan is based on data collected mainly from agro-firms during the field work phase of the research work between late January and May 1984. The main source of data collected from the author's visit to agro-firms is supplemented by further visits to Khartoum and Gezira Universities, other research institutions and to government statistical and planning agencies.

The sample of plants to be considered was selected by the author at the University of Bath, prior to the start of the field work. A detailed questionnaire was designed that included among others volume and value of inputs and output, plant ownership, age of plant, size of plant and estimates of the utilization of installed capacity. Furthermore the questionnaire was meant to include highlights the limiting factors in terms of marketing, raw materials, availability, foreign exchange allocation, skill development, employee motivation, labour policy and investment climate.

In all 24 agro-related industries were visited, resulting in 19 usable completed questionnaires. Two firms had reported fire accidents and as a result

all their files and records had disappeared. Three private firms refused to cooperate.

1. Sample

A sample of the plants to be interviewed was drawn by the author on the basis of the following four criteria; agro related processing plants, geographic location, size expressed as number of jobs, and branch activity. The geographic distribution covered 6 urban and semi-urban towns with a strong concentration in the central and eastern Sudan. Among the 19 plants visited 10 were large (over 250 workers) 9 were medium sized (between 50 and 249 workers) and none small, (between 10 and 49 workers). Number of firms visited are tannery, 3, textile spinning, 3, textile weaving, 6, wheat milling, 3, and groundnut decorticating, 4. Geographical distribution of firms interviewed in terms of location and numbers are Gezira area, 13, Khartoum, 2, Port Sudan, 1, Darfur, 1, Northern, 1 and Kordofan, 1.

2. Interviews

Most of the interviews were conducted in the factory itself, usually with the plant manager. At first managers of firms were asked (both by telephone call or letter from Khartoum) whether or not they agree to an interview. With those managers of firms who agreed, appointments were fixed in advance by the author. In each case, the respondent was told that the purpose of the survey was simultaneously to search for optimal choice of technique

and to determine how agro-firms in the Sudan utilised their existing plant and equipment and why. Each was assured that his response would remain anonymous. Average duration of the interview was 3 to 5 hours. All questionnaires were reviewed on the day of the interview and in six cases, I returned the following day to clarify ambiguous answers.

## LEATHER TECHNOLOGIES

### 7.7.1 Introduction

The first part of this chapter gave a short survey on the theoretical, conceptual and empirical discussion on the choice of technique. On the section dealing with the empirical discussion the author gave a clear indication on the approach he follows when examining choice of technology in the 19 Sudanese agro-firms. In the discussion of analytical method, assumptions of chosen wage rate, calculations of investment costs etc are stated. The section on the survey of questionnaire gave a detailed discussion and explanation of questionnaire and how factory visits were organised.

The second part of this chapter examines choice of technique in three tanning plants in the Sudan. They are Khartoum, White Nile, and Gezira Tanneries. The aim of this chapter is; firstly to investigate and analyse the range of technique actually in use in the three tanning processing factories. Secondly, looks at the productivity

(relative efficiency) of labour and capital, thirdly, looks at the unit cost of production and general employment implications, and fourthly, estimates the price ratio of capital to the price ratio of labour.

### 7.7.2 The Technology of Tanning

The main requirement for manufacturing leather is to soak raw hides and skins in a vessel so as to regain the water lost after flaying. The hides or skins are soaked for a period of hours or days in water to wash off lint and blood, and remove salt. Disinfectants and wetting agents can be added to the water. The soaked hides are then prepared for tanning by removing the hair and flesh which would impede the diffusion of tanning agents inside the hide. The two main tanning agents are vegetable tannage and chrome tannage. The tanned hide, called leather, is immune to putrification. In sequences the subsequent sub-processes are; sammying (to remove some of the moisture); splitting (to split thick leathers into grain and flesh parts); and shaving (to obtain the desired thickness). An important sub-process is then re-tanning, fat-liquoring and dyeing - the main objective of which is to make leather soft, pliable, stretchy and waterproof and to provide the desired colour. This done, the leather is dried. The stiffening produced in leather during drying can be eliminated by moistening the leather to about 24% moisture content.

Thereafter it is ready for further finishing operations - such as staking to make it more flexible, buffing to eliminate the defects on the grain part of the leather; and seasoning and spraying to give it an attractive appearance.

In the Sudan about 90% of the production is cattle hides upper leather. Upper leather is generally chrome rather than vegetable tanned. The raw cattle hides are soaked, limed and fleshed and pickled. The white pickled part turns light blue after being treated in a chrome liquor containing about 3% sodium chloride and 33% basic chromium sulphate. The tanning is undertaken at pH 2.5 to 3, later raised to pH 3.5 to 3.8 by adding a weak alkali such as sodium bicarbonate. After the tanning process (5 to 10 hours), the leather is put on a 'horse' (a wooden stand), for 1 to 2 days. The 'wet blue' leathers are further processed to finished leather. The entire processing from raw to finished stage may take approximately two weeks.

## 7.8 Performance Choice of Technique by Type of Establishment

There are three production lines in the Sudan leather making industry. Table 7.1 shows that the output of these production lines differ. Output per day as expressed in square feet upper leather is Khartoum tannery (3,607), White Nile tannery (3,516) and Gezira tannery (3,819).

| | Production line and the date of installation | | |
|---|---|---|---|
| | Khartoum Tannery 1961 | White Nile Tannery 1975 | Gezira Tannery 1976 |
| Output per day (as expressed in square feet) | 3607 | 3516 | 3819 |
| LABOUR<br>- skilled<br>- unskilled and semi-skilled | <br>85<br>474 | <br>57<br>290 | <br>75<br>334 |
| Capital cost (Sudanese pounds - 1976 prices)<br>- machines<br>- buildings | <br>1302000<br>450000 | <br>1937637<br>675000 | <br>4266391<br>825000 |
| O/K (square feet per Sudanese pounds) | 0.0021 | 0.0013 | 0.000075 |
| O/L output square feet per worker | 6.45 | 10.13 | 9.34 |
| L/K (worker per L Sudanese pounds | 0.00043 | 0.00018 | 0.00086 |
| K/L (Sudanese poundsper worker) - | 2329 | 5584 | 10431 |

Source: Own estimates based on data from Sudanese Agro-industries Survey 1984.

Labour input for Khartoum tannery is 85 skilled labourers and 474 unskilled and semi-skilled labourers. For White Nile 57 skilled labourers and 290 semi-skilled labourers and unskilled labourers. And for the Gezira tannery 334 semi-skilled and unskilled labourers and 75 skilled labourers.

The productivities of labour and capital are also shown in table 7.1. The techniques in use cover a wide range of capital intensity. The most capital intensive production line is the Gezira Tannery. The least capital intensive is the Khartoum tannery. For instance, investment per worker expressed in Sudanese pounds is, Khartoum (T) 2329, White Nile(T) 5584, and Gezira (T) 10431. The relatively labour-intensive, Khartoum tannery provides 5 times higher employment per unit of investment and a very much higher employment per unit of output. On the other hand output per worker is higher in the capital-intensive factories, White Nile tannery (10.13) followed by Gezira (9.34), and then Khartoum tannery (6.45). Relatively higher productivity of labour in the White Nile and Gezira tannery is related to higher skill and training and more capital use.

Table 7.2 shows the ratio of initial investment cost to daily output expressed in tons, that is, Khartoum (486), White Nile (743), and Gezira tannery (1,333). What is also interesting is the difference between techniques as indicated in the table 7.2, that is, other tanneries expressed as a ratio of Khartoum tannery - investment

Table 7.2 Investment cost per unit of output and that expressed as a ratio of Khartoum Tannery investment cost per unit of output

| | Khartoum Tannery | White Nile Tannery | Gezira Tannery |
|---|---|---|---|
| Initial investment Sudanese Pounds | 1752000 | 2612637 | 5091391 |
| Output per day in tons | 3607 | 3516 | 3819 |
| K/O investment cost per unit of output expressed in tons per day | 486 | 743 | 1333 |
| Expressed as a ratio of Khartoum Tannery | 1 | 1.53 | 2.74 |

Source: Own calculations based on data from the same source as Table(7.1.)

cost per unit of output. Hence, the initial investment cost of the Gezira tannery, in relation to daily output is thus about two times that of the White Nile tannery and nearer to three times that of the Khartoum tannery.

From table 7.3 unit production costs can be obtained by dividing the sum of the annual cost items by the total annual output expressed in square feet of upper leather. In the case of the White Nile tannery, unit production cost is calculated on detailed daily production cost based on sub-processes (disaggregated quantities). Unit cost of production expressed in Sudanese pounds are; Khartoum tannery (0.875), Gezira tannery (1.600) and White Nile tannery (1.386). This implies that the unit cost of production of the Gezira tannery is twice the unit cost of production of the Khartoum tannery.

The implications are Khartoum tannery is firstly, least capital-intensive factory in comparison with the other two, and secondly, the more labour intensive factory, the Khartoum tannery, has least cost of unit production. And thirdly, Khartoum tannery maximises employment in relation to investment and in relation to output.

## 7.9 Estimation of the Price Ratio of Capital to the Price Ratio of Labour in the Three Tannery Processing Plants in the Sudan

The annual capital cost is calculated by finding the equivalent constant annual payment paid for the life of

Table 7.3 Total Annual cost Sudan leather making factories (in Sudanese Pounds) (80/81)

| Annual Cost | Khartoum T | Gezira T | The White Nile Tannery |
|---|---|---|---|
| Raw Materials | 488000 | 364031 | unit production cost is calculated on detailed daily production cost based on sub-processes |
| Chemicals | 321000 | 294801 | |
| Water and Energy | 66900 | 61993 | |
| Labour costs | 395000 | 314601 | |
| Depreciation | | | |
| Building | 8250 | 138834 | |
| Equipment | 86680 | | |
| Maintenance costs | | | |
| Building | 5000 | 18000 | |
| Equipment | 72233 | 169948 | |
| Interest | | | |
| Fixed Assets (10%) | 84733 | 254569 | |
| Total Annual Cost | 1527796 | 1616777 | |
| Annual Leather Outputs expressed in square feet | 1744700 | 1013600 | |
| Unit Cost of production in square feet | 0.875 | 1.60 | |

| sub-process | Cost of one sq. feet leather |
|---|---|
| 1. Moisture or wet stage | 0.584 |
| 2. Chrome tanning (fleshing) | 0.275 |
| 3. Retanning | 0.182 |
| 4. Drying and finishing | 0.345 |
| | 1.386 |

Unit Cost of production expressed in square feet

1. Khartoum T 0.875) expressed
2. Gezira T 1.600) in Sudanese
3. White Nile T 1.386) pounds

Source: Own estimates based on data from the same source as Table (7.1)

the asset. The formula for converting a constant cash flow into present value is:

$$\text{Present value (Pv).} = \left[ \frac{K}{r} \quad 1 - \left(\frac{1}{1+r}\right)^{n} \right]$$

Where r = interest rate

n = number of years

In this calculation the inverse operation is performed and an initial acquisition cost which may be thought of as the present value of the investment cost, is converted into a constant annual cash flow, K by dividing the initial cost by:

$$\frac{\left[ 1 - \frac{1}{(1=r)} \; n \right]}{r}$$

The annuity calculation assumes a useful economic life of 15 years to all the tanneries' machines and it is also assumed that the building may be fully depreciated by the end of 30 years.

Table 7.6 is an extension of tables 7.4 and 7.5 and it makes a comparison of annual cost of capital to the annual cost of labour of the three tanneries. We see that in Khartoum tannery the annual cost of labour is more than that of annual cost of capital. On the other

Table 7.4 Monthly and Yearly wages and salaries in employment
(Calculated in Sudanese Pounds)

| | Khartoum Tannery | White Nile Tannery | Gezira Tannery |
|---|---|---|---|
| Number of Employed | | | |
| skilled labour | 85 | 57 | 75 |
| semi-skilled labour | 158 | 97 | 113 |
| unskilled labour | 316 | 193 | 221 |
| Monthly price(wage) employed | | | |
| skilled labour | 13175 | 8550 | 11250 |
| semi-skilled labour | 14062 | 8439 | 9685 |
| unskilled labour | 17064 | 10422 | 11934 |
| Monthly wages total | 44301 | 27411 | 32789 |
| Yearly wages(price) total | 531612 | 328932 | 393468 |

Table 7.5 Annual Capital Cost (in Sudanese Pounds)

| | Khartoum Tannery | White Nile Tannery | Gezira Tannery |
|---|---|---|---|
| 1. Initial Capital | | | |
| A. machine | 1302000 | 1937637 | 4266391 |
| B. building | 450000 | 675000 | 825000 |
| 2. Discount rate assumed | 10% | 10% | 10% |
| 3. Assumed length of life | | | |
| A. machine (years) | 15 | 15 | 15 |
| B. building (years) | 30 | 30 | 30 |
| 4. Annual investment cost | | | |
| A. Machine | 171169 | 254734 | 560886 |
| B. Building | 47734 | 71601 | 87512 |
| Total annual capital cost | 218903 | 326335 | 648398 |

Source: Table (7.4) and Table (7.5) Own estimates on data from the same source as Table(7.1)

Table 7.6 Ratio Price of Capital to the Price of Labour in the three tannery processing plants in the Sudan

| | Khartoum Tannery | White Nile Tannery | Gezira Tannery |
|---|---|---|---|
| Price of Capital (yearly) Sudanese pounds | 218903 | 326335 | 648398 |
| Price of Labour (yearly) | 531612 | 328932 | 393468 |
| Ratio Price of Capital to Price of Labour | 1:2.4 | 1:1 | 1:0.6 |

Source: Own estimates based on data from Table (7.4) and Table (7.5).

hand, in the case of Gezira tannery the annual cost of capital is more than that of labour. This reinforces our previous arrived result that Khartoum tannery uses more labour intensive techniques in comparison with the other two tanneries.

## 7.10 Summary and Conclusion

This chapter provided a short survey on the theoretical, conceptual and empirical discussion on the choice of technique; and then examined choice of technology taking the experience of three tanneries in the Sudan. The results of the enquiry is based on the basis of a survey conducted in early 1984.

The evidence from the survey shows that the relatively labour-intensive, Khartoum tannery, provides 5 times higher employment per unit of investment and a very much higher employment per unit of ouput in comparison with the most investment intensive, the Gezira tannery. The results of the enquiry also show that Gezira tannery involves more investment in relation to output. For example, the initial investment cost of Gezira tannery in relation to daily output is nearer to three times that of the Khartoum tannery. The White Nile tannery has the highest labour productivity, followed by Gezira tannery and then Khartoum tannery. It is also shown that the most investment-intensive plant, the Gezira tannery requires twice as much per unit cost of production

as the relatively labour-intensive plant, the Khartoum tannery.

Footnotes to Chapter Seven

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2. J. Pickett: "The Choice of Technology, Economic Efficiency and Employment in Developing Countries", World Development, Vol. 2, No. 3, 1974, p. 38.

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4. F. Stewart: "Choice of Technique in Developing Countries", Journal of Development Studies, Vol. 9 No. 1, 1972, pp. 99-121.

5. A.S. Bhalla: Technology and Employment in Industry (Geneva, ILO, 1981) pp. 86-87.

6. See among other, J. Gaude: Capital-Labour Substitution Possibilities: A Review of Empirical Evidence in A. Bhalla, Technology and Employment in Industry, Op. Cit., p. 35-58. D. Marawetz: "Elasticities of Substitution in Industry: What Do We Learn from Econometric Estimates", World Development, Vol. 4, 1976, pp. 11-15.

7. For critiques see for example, K. Arrow et al, "Capital-Labour Substitution and Economic Efficiency", Review of Economics and Statistics", Vol. 43, No. 3, 1961, pp. 225-50. J. Gaude (1975) D. Marawetz (1974)

8. See Arrow et al (1961), J. Gaude (1975) Marawetz (1974), and L.J. White: "The Evidence on Appropriate Factor Proportion for Manufacturing in Less-Developed

Countries: A Survey", Economic Development and Cultural Change, Vol. 27, 1978, pp. 27-60.

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10. See C. Cooper, R. Kaplinsky and others: "Choice of Techniques for Can Making in Kenya, Tanzania and Thailand", in A.S. Bhalla: Technology and Employment in Industry, Op. Cit., pp. 91-128. C.P. Timmer, "Employment Aspects of Investment in Rice Marketing in Indonesia", Trade and Development, Vol. 11, No. 1, 1972. F. Stewart: Technology and underdevelopment (London, Macmillan, 1978).

Appendix (٦.1)

The Survey Forming the Basis of a Study of Choice of Technique and Optimal Utilisation of Industrial Capacity in the Agro-industrial Sector of the Sudan

The Survey

Interviews were conducted by the researcher between February and May 1984, mainly in the Gezira area of the Sudan. In all 24 agro-industrial plants were visited, resulting in 19 usable completed questionnaires. Two firms reported had fire accidents and as a result all their files and records disappeared with it. Three private firms refused to co-operate.

1. Sample

A sample of the plants to be interviewed was drawn by the researcher on the basis of the following four criteria; agro-related processing plants, geographic location, size expressed as number of jobs, and branch activity. The geographic distribution covered 6 urban and semi-urban towns with strong concentration in the Central and Eastern Sudan. Among these 19 establishments were 10 that were large (over 250 wrokers) 9 were medium sized (between 50 and 249 workers) and none small, between 10-49. Number of enterprises visited are Tannery 3, Textile Spinning 3, Textile Weaving, 6, Wheat Milling, 3, and Groundnut Decorticators, 4. Geographical distribution of firms interviewed in terms of location and numbers are: Gezira Area 13, Khartoum, 2, Port Sudan, 1, Darfur (1), Northern, 1, and Kordofan 1.

2. Interviews

Most of the interviews were conducted at the plant, usually with the plant manager. In each case, the respondent was told that

the purpose of the survey was simultaneously to search for appropriate choice of technology and to determine how manufacturing firms utilised their existing plant and equipment and why. Each was assured that his response would remain anonymous. Average duration of the interview was 3 to 5 hours. All questionnaires were reviewed on the day of the interview and in six cases, I returned the following day to clarify ambiguous answers.

1. Name of the Plant

2. Plant Characteristics

   2.1 Product

   Product ..... Total Sales

   Product ..... Sales Abroad

   Product ..... Total Sales

   Product ..... Sales Abroad

   2.2 Plant Ownership

   2.3 Age of plant (useful economic life)

   First built .....

   Last Major Expansion .....

   2.4 Location .....

   2.5 Size of Plant .....

   Total Production Employees .....

   Value of Assets ..... Value

   Annual Sales Value ..... Value

   Value Added ..... Value

3 PRODUCTION DATA 1982-83

| Product/ activity group | Unit | Maximum output/shift | | Shifts worked per Output year 1982-83 | | | | Bottleneck (major reason for short-fall) |
|---|---|---|---|---|---|---|---|---|
| | | Rated | Realised | Day | Year | Planned | Actual | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4.1 LABOUR REQUIREMENT

| Product/ activity Group | Data | Production | | | | Maintenance tech. services | | | | Admin. support | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SK | US | SUP | TOT | SK | US | SUP | TOT | | |
| | Per day | | | | | | | | | | |
| | Reg.mds. | | | | | | | | | | |
| | per year | | | | | | | | | | |
| | OT mds. per year | | | | | | | | | | |
| | Per day | | | | | | | | | | |
| | Reg.mds. per year | | | | | | | | | | |
| | OT mds. per year | | | | | | | | | | |

4.2 Output per man hour .....

4.3 Wage rate per production worker on the average .....

5 INPUT RESOURCES FOR 1982-83 OUTPUT LEVEL(LS '000)

| Product/ activity | Assets employed | | Material cost | | Salary bill | | other expenses | grand total |
|---|---|---|---|---|---|---|---|---|
| | Fixed | Work cap | Local | Import | Reg. | OT | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

N.B 1. Fixed Capital Investment

a. Land

b. Building

c. Machinery

2. Working Expenses

a. Chemicals

b. Fuel and Power

c. Salaries and Wages

d. Overhead Charges

e. Depreciation

- on buildings

- on machinery

f. Repairs and maintenance

g. Interest on seasonal working capital

6 Level of Utilisation - Time and Intensity

6.1 During the typical operating days you ran some part of the plant for ..... hours.

6.2 During operation, how much of the entire plant is typically in use? ..... %.

7 The Pattern of Utilisation over the Year

7.1 Over the typical year, are there regular patterns of greater or lesser production ..... Yes or No.

7.2 When? .....

7.3 By how much does production vary over these patterns?

.....

7.4 Why? ..... Demand variations

Supply Input Variations

Availability

Price

7.5 Does the Plant have periods of full time shutdown?

..... Yes or No.

8 Capacity and Utilisation

8.1 At what percent of full capacity did you operate last year?

.... %.

8.2 What would you consider to be desirable 'normal' work week for the plant? ..... hours of operation per week.

9 If industrial capacity is underutilised what in your opinion are the main reasons for this?

10 What are the main constraints on double or on multiple shift work?

11. Do you consider that employment and output of the manufacturing sector might be expanded, and to what extent by the wider use of double or multpile shift, assuming that constraints are reduced or eliminated?

12. Do you consider that policies to promote industrialisation through, e.g. easy access to investment capital, favourable terms of investment financing, etc, etc, are among the causes of inappropriate choice of technique and under utilisation of capacity?

13. Market Structure
    (a) Market Share
    (b) Seasonality

14. The Duration of working week in days and working shift in hours.

15. Rank the various technological information which you use before purchasing machinery or equipment.
    (a) Personal experience .....
    (b) Direct contact with other foreign factories in the same industry .....
    (c) Advice from equipment suppliers .....
    (d) plant visits abroad .....

16. Origin of the machines.
    (a) Local
    (b) Third World country, e.g. India, Brazil
    (c) Western Europe
    (d) Eastern Europe
    (e) United States

17 TYPES OF TECHNIQUES

| Technique of Production | | 1 | | | 2 | | |
|---|---|---|---|---|---|---|---|
| Sub-Process stages - | Techniques | Technique used | Labour | | Technique used | Labour | |
| | | | ski. | unski. | | ski. | unski. |
| | | | | | | | |



18 If you wish to give comment on any other relevant information, policy restrictions affecting the choice of technique and full utilisation of industrial capacity please state briefly.

Appendix (7.2)

Calculation of Annual Capital Cost of Three Tanneries in the Sudan

The annual capital cost is calculated by using an annuity formula, assuming an economic life of 20 years for all equipment. Buildings were assumed to have a life of 50 years for Gezira Flour Mill and Blue Nile Flour Mill and 40 years for the Gezira Tenants' Union. The discount rate is 10 per cent throughout.

This annual investment cost is calculated (see table 7.7) by finding the equivalent constant annual payment paid for the life of the asset. The formula for converting a constant annual cash flow, B, into present value is:-

$$\text{Present Value (PV)} = \frac{B}{r}\left[1 - \frac{1}{(1+r)^n}\right]$$

where r = interest rate and n = number of years

B = annual cash flow

To calculate the annual capital cost in this case the inverse operation is performed, and an initial acquisition cost, which may be thought of as the present value of the capital cost, is converted into a constant annual cash flow, B, by dividing the initial cost by

$$\frac{1 - \frac{1}{(1+r)^n}}{r}$$

$$B = \frac{PV}{\frac{1 - \frac{1}{(1+r)^n}}{r}}$$

1. Khartoum Tannery

Initial machine price = PV = 1302000

Interest rate (r) = 10  Number of Years (n) = 15

$$= \frac{1302000}{\frac{1 - \frac{1}{(1.1)^{15}}}{10/100}}$$

$$\log 1.1 = 0.0414$$

$$15 \log 1.1 = 0.621$$

$$\text{antilog } 0.621 = 4.178$$

$$1 - \frac{1}{4.178} = \frac{4.178-1}{4.178}$$

$$= \frac{3.178}{4.178}$$

$$\frac{130200 \times 4.178 \times 10}{3.178 \quad 100} = 171169$$

Khartoum Tannery

Annual machine price (cost) 171169

2. White Nile Tannery

Machine initial cost = 1937637

$$\frac{1937637 \times 4.178 \times 10}{3.178 \times 100} = 254734$$

White Nile Tannery annual

machine cost (price) = 254734

3. Gezira Tannery

Machine initial cost, 4266391

Calculation of annual machine price

$$\frac{4266391 \times 4.178 \times 10}{3.178 \quad 100}$$

$$= \underline{560886}$$

In calculation annual building cost we use the assumed life span of all buildings at 30 years, interest rate if 10%.

$$\frac{1 - \frac{1}{(1.1)^{30}}}{10/100}$$

1. Khartoum Tannery

Building cost = 450000

r = 10 n = 30

$$\frac{1 - \frac{1}{(1.1)^{30}}}{10/100}$$

log 1.1 = 0.0414

30 log 1.1 = 1.242

antilog 1.242 = 17.46

$$1 - \frac{1}{17.46} = \frac{17.46 - 1}{17.46} = \frac{16.46}{17.46}$$

hence, Khartoum Tannery annual building cost,

$$\frac{450000 \times 17.46 \times 10}{16.46 \quad 100} = 47734$$

$$\underline{47734}$$

2. White Nile Tannery

Initial Building cost = 675000

Using the same calculation as that of Khartoum Tannery, the White Nile Tannery annual building cost is:-

$$\frac{675000 \times 17.46 \times 10}{16.46 \times 100} = \underline{71601}$$

3. Gezira Tannery

Building cost = 825000

Gezira Tannery Annual building cost:-

$$\frac{825000 \times 17.46 \times 10}{16.46 \times 100}$$

$$= \underline{87512}$$

N.B. Same approach for calculation is used to find the annual capital cost of the other plants surveyed.

# CHAPTER EIGHT

# CHOICE OF TECHNIQUE - SPINNING AND WEAVING MILLS IN THE SUDAN

## 8.1 Introduction

Chapter seven examined choice of technique in three tannery plants in the Sudan. This chapter continues focusing on the choice of technology and takes the examples of textile spinning and weaving in the Sudan. The analysis of the textile industry covers the three major divisions of the industry namely, spinning, weaving and finishing. This study focuses and confines itself to the analysis of the two activities, spinning and weaving. I have fucused on three spinning mills located in the central and eastern Sudan and six weaving mills located in the different parts of the Sudan. The three spinning mills are Haj Abdalla, International and Wad Medani mills. The six weaving mills are Shendi, Kosti, Dongalla, Nyalla, Kadugli and Edueim. This chapter aims at investigating the range of technique actually in use in the spinning and weaving mills, secondly looking at the productivities (relative efficiency) of labour and capital. Thirdly estimating and analysing the investment cost per worker and investment cost per unit of output and their general employment implications.

## 8.2 Spinning Mills

### 8.2.1 Spinning Background

Spinning, in textiles, is a process of drawing out

fibres from a mass and twisting them together to form a continuous thread or yarn done by hand-labour or by machinery. In man-made fibre production the term is applied to the extrusion of a solution to form a fibre.

The early machine for turning fibre into thread or yarn is the spinning wheel. The spinning wheel was probably invented in India, though its origins are obscure. It reached Europe via the Near East in the Middle Ages. It replaced the earlier method of hand spinning, in which the individual fibres were drawn out of a mass of wool held on a stick or distaff, twisted together to form a continuous strand and wound on a second stick or spindle. The first stage in mechanising the process was to mount the spindle horizontally in bearing so that it could be rotated by a cord encircling a large, hand-driven wheel. The distaff, carrying the mass of fibre, was held in the left hand, and the wheel slowly turned with the right. Holding the fibre at an angle to the spindle produced the necessary twist.

### 8.2.2 Spinning Technology

The mill receives the raw material in a compressed form in bales, containing a certain amount of dirt. The bales are broken up and the cotton is partially cleaned by machine with rapidly revolving cylinders, and also often by some form of blowing operation, to remove stray particles. In the next operation 'carding' the cotton is further opened, thinned and cleaned and the fibres are

brought more in line with one another. A carding engine consists of a number of revolving cylinders covered with spikes; the fibres are brushed by the cylinder spikes until they are lying more or less in the same direction and form a thin web. The web is then cut up to form a number of separate strands, the slivers which are slightly twisted and collected in large cans. The cans are moved to the next machine, the 'drawframe', where several slivers are put together and pulled out into one new sliver. This process tends to further straighten and align the fibres. In the next stage they are simultaneously pulled and twisted to form a 'roving' which is like a very soft thick string. The rovings are then put on a 'spinning frame'; this machine alternates the roving and twists it to form a thread, and winds the thread onto spools. Finally a winding machine transfers the thread from the spools onto a larger plackage, the 'comb'.

## 8.3 Performance - Choice of Technique by Type of Establishment

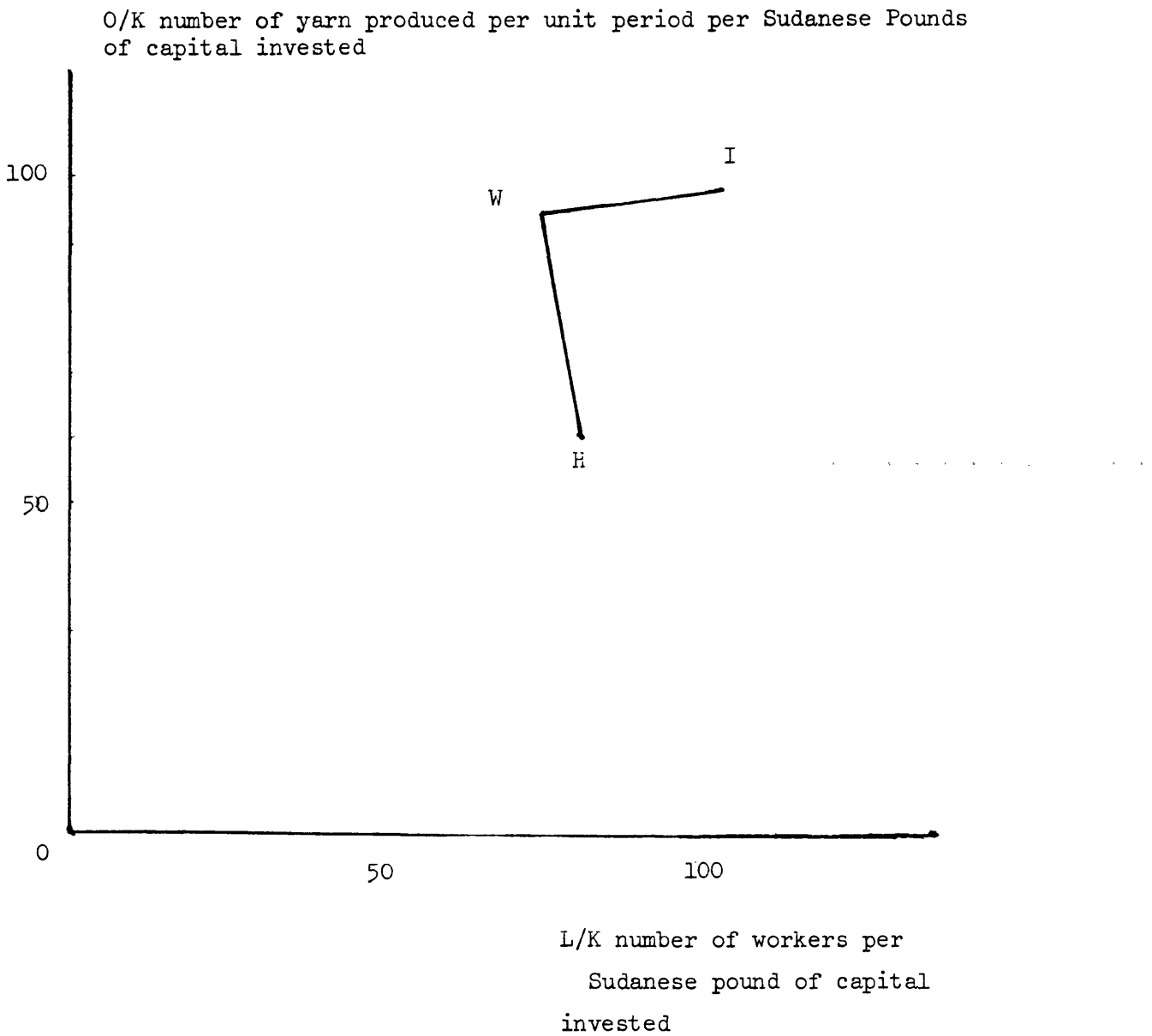
Table 8.1 indicates that the three spinning mills located in eastern Sudan produce substantially different rates of output per day as expressed in kilograms. Haj Abdalla spinning mills' production per day is 7,000 kg. International spinning 3,072 kg, and Wad Medani spinning, 15,000 kg. Labour input for the spinning mills and these include, skilled, semi-skilled, and unskilled labour are Haj Abdalla, 1,200, International, 405, and Wad Medani

Table 8.1 Factor Productivity of Spinning Factories in the Gezira Area of the Sudan

| Establishment | Haj Abdalla | International | Wad Medani |
|---|---|---|---|
| Output per day as expressed in kg | 7000 | 3072 | 15000 |
| Labour | 1200 | 405 | 1500 |
| Capital cost expressed in Sudanese pounds<br>- machine<br>- building | <br>19550000<br>3450000 | <br>5312500<br>937500 | <br>27200000<br>4800000 |
| O/K kg per Sudanese pounds | 0.000304 | 0.00049 | 0.00047 |
| O/L output in kg per worker (output per worker) | 5.83 | 3.22 | 10.00 |
| L/K worker per Sudanese pounds | 0.000061 | 0.000076 | 0.000055 |
| K/L Sudanese pounds per worker (capital per worker) | 16292 | 13117 | 18133 |
| K/O capital -output ratio (machine cost per unit of output) | 2793 | 1729 | 1813 |

Source: Own estimates based on data from Sudanese Agro-industrial Survey (1984)

Fig 8.1 Investment function- three Spinning Factories in the Sudan




H = Haj Abdalla Spinning

W = Wad Medani Spinning

I = International Spinning

spinning mill, 1,500.

The productivities of labour and capital are also shown in Table 8.1. It is revealed that the three spinning factories use a different range of techniques. Capital per worker expressed in Sudanese pounds are Haj Abdalla mill 16,292, International 13,117 and Wad Medani, 18,133. Machines in use in Wad Medani spinning mill have an acquisition cost per worker nearly one and a half that of the International spinning mill, and Haj Abdalla spinning machine cost per worker is 1.25 that of International spinning. This also means that International spinning factory maximises employment in relation to investment and also in relation to output.

Table 8.2 shows the ratio of acquisition costs to daily output expressed in kilograms of yarn of the three spinning mills in the Sudan. The acquisition costs per unit output ratios is higher in Haj Abdalla, (2,793) and fairly similar in International (1,729) and Wad Medani (1,813). It appears from table 8.2 that Haj Abdalla spinning machines have higher capital intensity than either International or Wad Medani spinning. In other words, in terms of capital-output ratio, (table 8.3) Haj Abdalla spinning mill is more than one and a half times that of either International or Wad Medani spinning mills. Table 8.3 also indicates how output per employee varies according to the technique used. Wad Medani spinning has the highest labour productivity (10.00), when compared with the other two mills, Haj Abdalla (5.83) and International spinning (3.22) Unit cost of production of

Table 8.2 Output per labourer, output per machine, capital-output ratio and capital-labour ratio in spinning 1982/83

| | Haj Abdalla | International | Wad Medani |
|---|---|---|---|
| Output per worker | 5.83 | 3.22 | 10.00 |
| Output per machine | 0.000304 | 0.00049 | 0.00047 |
| Capital-labour ratio | 16292 | 13117 | 18133 |
| Capital-output ratio | 2793 | 1729 | 1813 |
| L/K worker per machine | 0.000061 | 0.00076 | 0.000055 |

Table 8.3 Output per worker, output per machine, capital-output ratio, and capital labour ratio in spinning 1982/83 (in index numbers expressed as a ratio of International Spinning in comparison to the other two spinning mills)

| | | | |
|---|---|---|---|
| Output per worker | 181 | 100 | 311 |
| Output per machine | 61 | 100 | 96 |
| Capital-labour ratio | 124 | 100 | 138 |
| Capital-output ratio | 162 | 100 | 105 |
| L/K worker per machine | 80 | 100 | 72 |

Source: Table (8.2) and Table (8.3). Own calculations based on data from the source of Table (8.1).

textile spinning is calculated and presented in table 8.4b. We see that at current existing factor prices and at actual capacity utilisation, the optimal technique of the three textile spinning is Wad Medani textile and International textile spinning.

Spinning and weaving firms in the Sudan suffer from under utilised capacity of investment (see chapter 10 for a detailed discussion). They work daily mostly on one shift basis, productivity in these spinning and weaving firms generally, do not exceed 50% of the designed capacity. Machines are simply left idle. Still in the case of the Sudan, where capital is highly encouraged, double or triple shifts can greatly decrease the overall capital-labour ratio.

The capital per worker in the three Sudanese spinning factories in one shift basis, expressed in Sudanese pounds are (see table 8.1) Haj Abdalla 16292, International 13117, and Wad Medani 18133. Simple and practical way of increasing labour use (labour absorption) and at the same time, lowering the capital-output ratio is to utilise the existing capital (machines) stock more intensively, for example by working two shifts instead of one. Table 8.5 shows clearly the increase in labour absorption when the factories shift from one to two shifts, for example Haj Abdalla 1200 (1920), International 405 (648) and Wad Medani 1500 (2400). And with the increase in the number of employed the capital-labour ratio decreases. Again table 8.5 see the decrease of

Table 8.4a Annual cost of Capital and Labour and Annual Output in Three Textile Spinning Factories

| | Haj Abdalla | International | Wad Medani |
|---|---|---|---|
| Annual Labour Cost | 664992 | 225012 | 831240 |
| Annual Capital Cost | 2936126 | 801742 | 4073582 |
| Annual Output | 2100000 | 921600 | 4500000 |

Table 8.4b Unit Cost of Production, Textile Spinning

| Unit Costs | Production Line | | |
|---|---|---|---|
| Labour | 0.32 | 0.24 | 0.18 |
| Capital | 1.34 | 0.87 | 0.91 |
| Total | 1.66 | 1.11 | 1.09 |

Source: Table 8.4a and table 8.4b, own computation based on data from the same source as table 8.1.

Capital- labour ratio (K/L), Haj Abdalla, 16292 (10182) International 13117 (8193) and Wad Medani 18133 to (11333). In other words an increase of capital utilisation raises the labour absorption and decreases the capital-labour ratio.

Table 8.5 Capital-labour relationship and labour increasing with optimum utilisation of capital

| | Haj Abdalla spinning | International spinning | Wad Medani spinning |
|---|---|---|---|
| capital (machine) cost | 19550000 | 5312500 | 27200000 |
| labour one shift | 1200 | 405 | 1500 |
| K/L capital per worker | 16292 | 13117 | 18133 |
| Labour two shift | 1920 | 648 | 2400 |
| K/L capital per labourer on two shift basis | 10182 | 8198 | 1133 |

Source: Own estimates based on data from the same source as Table (8.1).

Table 8.6 Annual Investment Cost by category of machine

| category of machine | estimated life in years | Annual Investment cost at percentage discount rate indicated | |
|---|---|---|---|
| | | 10 | 20 |
| Haj Abdalla machine | 15 | 2570167 | 4181150 |
| International machines | 20 | 623964 | 1091216 |
| Wad Medani | 15 | 3575884 | 5817254 |

Source: Own computation based on data from the same source as Table (8.1).

Intensive use of machinery (say two or three shifts) means more frequent halts for repairs, but repairs can be labour intensive activity. The overall effect could be greater labour intensity and employment creation and greater efficiency in the use of all resources.

Transforming the initial cost into an annual equivalent, to take into account the length of life, makes quite a difference to the comparison, as table 8.6 shows. Because of its very long life, machines of International Spinning appear to be substantially cheaper. The initial investment cost of Wad Medani machines is very high, this is also reflected in the annual equivalent.

## 8.4 Weaving Technologies

Weaving fundamentals - the classical method of weaving is essentially the insertion of a continuous length of weft-yarn from a shuttle, which traverses to and fro across the warp sheet in the loom and leaves behind a trail of weft (pick) at each passage. Weaving involves three primary actions and two secondary ones. These are briefly described below.

### Primary actions

The three primary actions are: shedding, picking and beating up. They must be performed in strict rotation in all looms.

### Shedding

To form any weave structure, all warp threads under which a particular pick has to lie in the ultimate cloth are raised during the shuttle passage while all threads which the same pick has to pass over, are lowered. Thus, for each pick inserted, the individual warp threads are raised or lowered as

dictated by the weave plan. The action of raising and lowering the warp threads in this way is known as 'shedding', while the sheet opening so formed is called the 'shed'.

'Picking'

The action of passing the shuttle through the shed is called picking.

Beating up

Finally, after the insertion of each pick, the pick of weft itself has to be pushed forward by a 'reed' (a type of closed comb through which all the threads are drawn) to a point adjacent to the previous pick, known as the'fell' where cloth is thus formed. This third action is called 'beating up'.

Secondary actions

In addition to the primary actions, two secondary actions are necessary. However, the instant at which they are performed is at the discretion of the weaver in the case of simple hand looms. On the other hand, strict control and timing in relation to primary motion is required for power looms.

Taking up

This action involves the 'taking up' of woven cloth as weaving proceeds so that the fall is maintained in the same position.

Letting-off

This action involves the 'letting-off' of further warp from a beam at the back of the loom to replace that woven into the cloth.

## 8.5 Performance - Productivities of Labour and Capital in the Weaving Factories

Table 8.7 gives the main characteristics of the six main production lines in the Sudan weaving mills selected. It shows that the six weaving mills produce not the same output per day as expressed in metres. Output per day as expressed in metres is Shendi weaving million 3816, Kosti, 4599, Dongalla 906, Nyalla 3043, Kadogli 2275, and Edueim 2600 metres per day. Labour input for the weaving mills (and these include skilled and unskilled labour) are Shendi 460, Kosti 320, Dongalla 225, Nyalla 228, Kadugli 284 and Edueim 317.

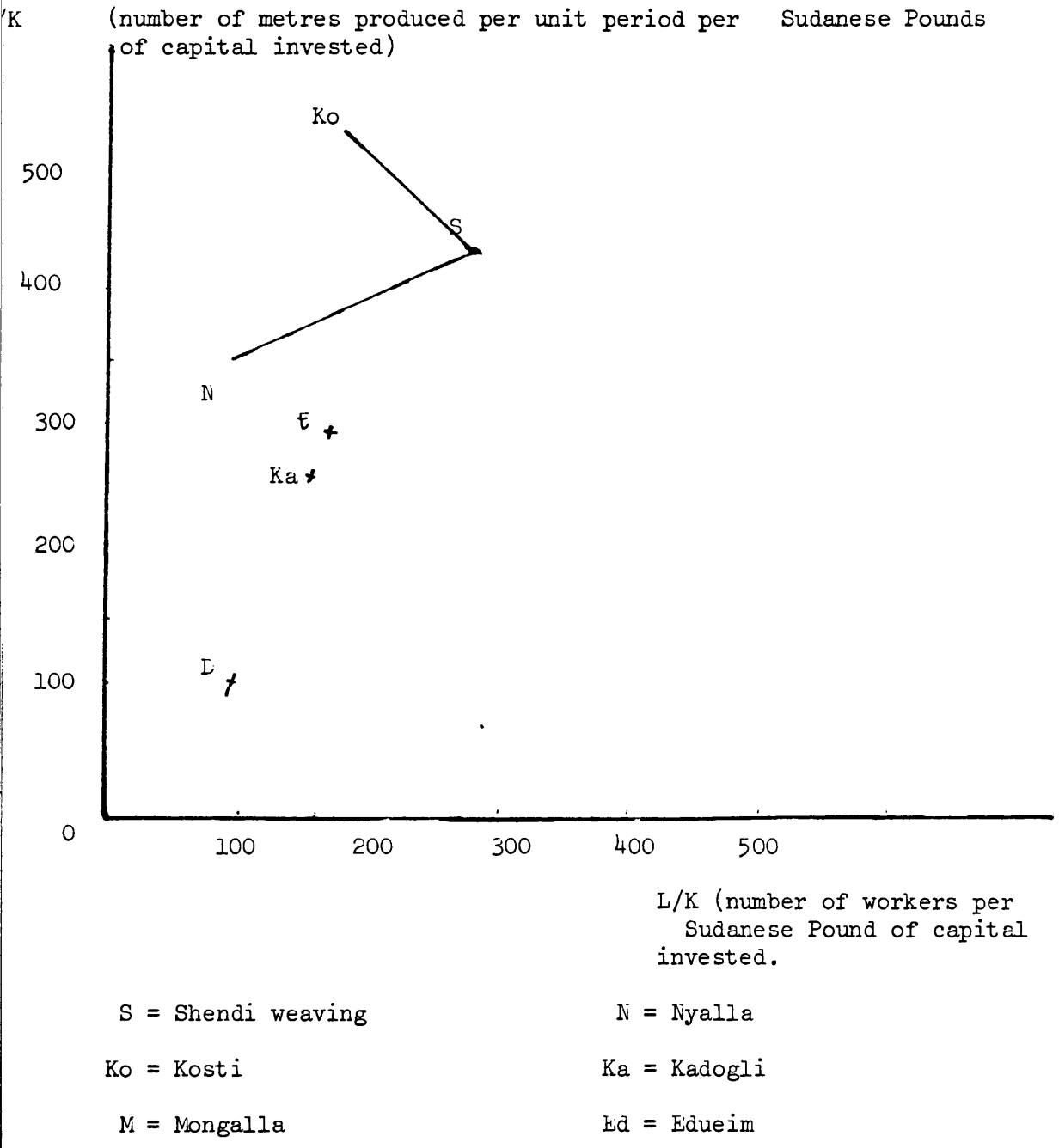
The productivities of labour and capital are revealed in table 8.7. Output per worker of the six weaving mills are shown in table 8.7. It is indicated in the table that Kosti, Nyalla, and Shendi have higher labour productivity than the other three (Dongalla, Kadugli and Edueim) weaving mills. For example Shendi's output per worker is two times that of Dongalla weaving mill. Furthermore, output per capital is higher in Kosti, Shendi and Nyalla when we compare them with the other three weaving mills. For example, Kosti's output per unit of capital is two times that of Kadugli. The implication is that Edueim, Dongalla and Kadugli weaving mills are inefficient, that is, they have been associated with a lower output per unit of capital as well as a lower output per unit of labour. On the contrary, Kosti, Nyalla and Shendi weaving mills are

Table 8.7 Factor Productivity - Weaving Mills in the Sudan

| | Shendi | Kosti | Dongalla | Nyalla | Kadugli | Edueim |
|---|---|---|---|---|---|---|
| Output per day as expressed in metres | 3816 | 4599 | 906 | 3043 | 2275 | 2600 |
| Labour | 460 | 320 | 225 | 228 | 284 | 317 |
| Capital cost Sudanese Pounds at 1978 prices<br>- machine<br>- building | 3950000<br>950000 | 3950000<br>950000 | 3950000<br>950000 | 3900000<br>900000 | 3900000<br>900000 | 3950000<br>950000 |
| O/K metres per Sudanese pounds | 0.00078 | 0.00094 | 0.00018 | 0.00063 | 0.00047 | 0.00053 |
| O/L Output in metres per worker (output per worker) | 8.230 | 14.37 | 4.03 | 13.34 | 8.01 | 8.20 |
| L/K worker per Sudanese pounds | 0,00012 | 0.000081 | 0.000043 | 0.000043 | 0.000072 | 0.000080 |
| K/L Sudanese Pounds per worker | 8587 | 12344 | 17555 | 17105 | 13732 | 12461 |
| K/O | 1035 | 859 | 4308 | 1282 | 1714 | 1519 |

Source: Own estimates based on data from Sudanese Agro-industrial Survey 1984.

Figure 8.2 Investment function- six weaving textile mills in the Sudan




S = Shendi weaving

Ko = Kosti

M = Mongalla

N = Nyalla

Ka = Kadogli

Ed = Edueim

efficient, that is, they have been associated with higher output per unit of capital and higher output per unit of labour.

Table 8.2 also shows the ratio of initial investment cost to daily output expressed in metres of the six weaving mills in the Sudan. The investment costs per unit of output ratios are higher in Dongalla, Kadugli and Edueim weaving mills and are lower in Kosti, Shendi and Nyalla mills. If we take the example of Dongolla and Kosti, Dongolla's weaving mill acquisition cost per unit of output is four times that of Kosti weaving mill. The implication is that Dongalla, Kadugli and Edueim mills are using higher capital intensity in comparison with Kosti, Shendi and Nyalla weaving mills.

Table 8.9 shows that - Dongalla (100) weaving machines has acquisition costs per unit of output five times that of Kosti (19) and four times that of Shendi (24). Table 8.9 also shows how output per worker per day varies according to the range of techniques and machines. Taking Dongalla (100) as a point of comparison, Kosti (356) weaving mill is more than 3½ that of Dongalla,and Shendi (204) output per worker is more than 4 times that of Dongalla.

Table 8.8 and 8.9 show also that Kosti and Shendi weaving mills maximise employment in relation to investment and also employment in relation to output, with Kosti having the highest labour productivity and Shendi

Table 8.8 Output per labourers, output per machine, capital-output ratio and capital-labour ratio in weaving -1981/82

| | Shendi | Kosti | Dongalla | Nyalla | Kadugli | Edueim |
|---|---|---|---|---|---|---|
| output per worker | 8.23 | 14.37 | 4.03 | 13.34 | 8.01 | 8.20 |
| output per machine | 0.00078 | 0.000941 | 0.00018 | 0.00063 | 0.00047 | 0.00053 |
| capital - labour ratio | 8587 | 123441 | 17555 | 17105 | 13732 | 12461 |
| capital- output ratio | 1035 | 859 | 4308 | 1282 | 1714 | 1519 |

Table 8.9 Output per worker, output per machine, capital-output ratio and capital-labour ratio in weaving 1981/82,

(in index numbers - expressed in Dongalla weaving as a comparison to the others)

| | | | | | | |
|---|---|---|---|---|---|---|
| output per worker | 204 | 356 | 100 | 310 | 198 | 203 |
| output per machine | 433 | 522 | 100 | 350 | 261 | 294 |
| capital-labour ratio | 49 | 70 | 100 | 99 | 78 | 77 |
| capital-output ratio | 24 | 19 | 100 | 29 | 40 | 35 |

Source: Table (8.8) and Table (8.9) Own Calculations based on data from the same source as Table (8.7).

Table 8.10 Annual Cost of Capital and Labour and Annual Output in Six Textile Weaving Mills

| | Shendi | Kosti | Dongalla | Nyalla | Kadugli | Edueim |
|---|---|---|---|---|---|---|
| Annual Labour | 377568 | 262656 | 184968 | 188064 | 233568 | 260712 |
| Annual Capital | 620043 | 620043 | 620043 | 608186 | 608186 | 620043 |
| Annual Output | 1144800 | 1379700 | 271800 | 912900 | 682500 | 180000 |

Table 8.11 Unit Cost of Production - Textile Weaving

| | | | | | | |
|---|---|---|---|---|---|---|
| Labour | 0.33 | 0.19 | 0.68 | 0.21 | 0.34 | 1.44 |
| Capital | 0.54 | 0.45 | 2.28 | 0.67 | 0.89 | 3.44 |
| Total | 0.87 | 0.64 | 2.96 | 0.88 | 1.23 | 4.88 |

Source: Table 8.10 and table 8.11, own calculation based on data from the same sources as table 8.7.

relatively higher labour productivity, when compared with other weaving mills. On the other hand, Dongalla and Nyalla weaving mills generate the least employment in relation to any given investment. Dongalla has the lowest labour productivity.

The unit cost of output from the six textile weaving mills are calculated and presented in table 8.1. It shows that unit cost of production, at actual capacity utilisation and existing factor prices are far less in Kosti, Shendi and Nyalla mills than they are in Kadugli, Dongolla and Edueim weaving mills. Hence, when we consider these textile mills at current factor prices, Kosti, Shendi and Nyalla weaving mills have relatively optimal technique.

## Summary and Conclusion

This chapter has investigated choice of technique in textile spinning and weaving plants in the Sudan based on the basis of a survey carried out in early 1984.

The results from the survey show that the most investment-intensive technique, the Wad Medani spinning mill requires nearly one and a half times as much investment per worker as the most labour intensive, the International spinning mill; and about one and a quarter times as much as the Haj Abdalla spinning mill, if we assume equal capacity utilisation for each technique. The analysis also finds that the initial investment cost

of Haj Abdella spinning mill, in relation to daily output is more than one and a half as much as either International or Wad Medani spinning mills. Wad Medani spinning mill has the highest labour productivity when compared with the other two mills Haj Abdella and International spinning. This implies that ouput per worker is higher in the more investment intensive, Wad Medani spinning firm. The next chapter continues with the final discussion on the choice of technique - Wheat milling and groundnut decorticators in the Sudan.

# CHAPTER NINE
# CHOICE OF TECHNIQUE - WHEAT MILLING AND GROUNDNUT DECORTICATORS IN THE SUDAN

## 9.1 Introduction : Wheat Milling

Previous aggregative research on the choice of technique emphasised the possibilities of substitution in the actual processing operating. However, experience has reveled that in most plants a relatively small percentage of the labour force is involved in the operation. It is now recognised more and more, that most employment occurs in the auxiliary (periphery) activities and it is here that the potential pay off to substitution of labour for capital is of the greatest quantitative significance.

Any machine is normally a small part of the picture. There are vertical and horizontal links with other investments in the productive chain. Horizontally, complementary investments are required (such as buildings). Vertically, there are all the preparatory activities - preparation of materials, transport to the site, and all the subsequent activities of processing, packing and transporting, that may not be covered by what has been described as the 'core' technique.

The three wheat grinding mills in the Gezira area; the Gezira Flour mill, the Blue Nile Flour mill, and the Gezira Tenants' Union, process about 50% of the total mill capacities in the Sudan. And at the same time, they are well located since the Gezira scheme is the main area of wheat production. 72% of wheat in the Sudan is produced in the Gezira area and hence the scope for milling expansion and employment creation is very high. The Gezira Flour mill and the Blue Nile Flour mill are privately owned and are located in Merringan (Wad

Medani) and the Gezira Tenants' Union is situated in Goz-kabro (Hassa-Hissa), and it belongs to the co-operative society.

The chapter aims at identifying the range and actual technique is use in the wheat-grinding mills in the Gezira area of the Sudan. Secondly, investigating and analysing productivities (relative efficiency) of labour and capital. Thirdly, estimating the ratio price of capital to the price of labour for each milling processing. And fourthly, looking at the investment cost per unit of output, and their general employment implications.

## .2 Technological evaluation in the wheat milling industry

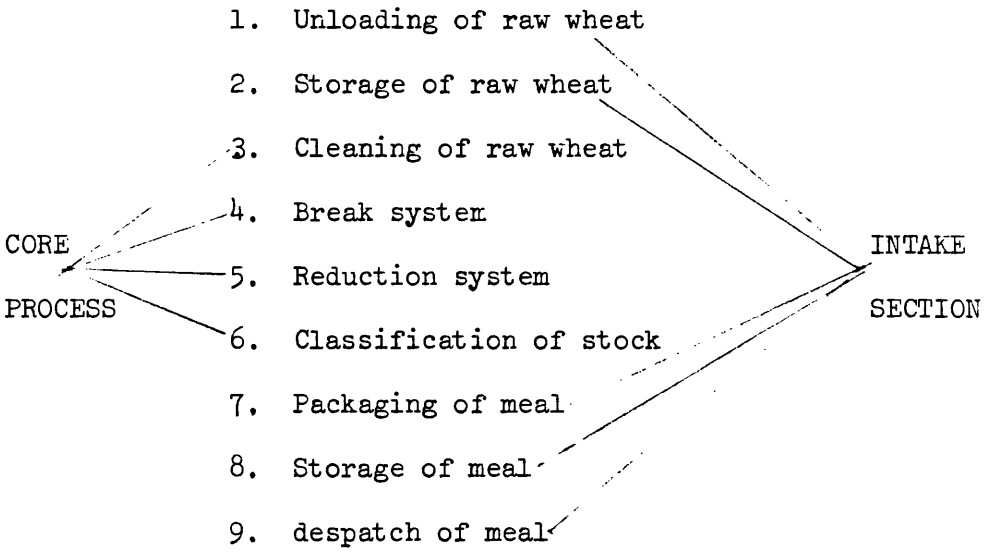
The industry includes a wide range of different types of mills and different products embodying different physical characteristics and different levels of service.

Why is wheat milled? It is because when milled into small particles the range of culinary preparations that are possible is greatly increased, in particular the ability of the wheat to absorb water is much enhanced. In many sub-Saharan African countries wheat flour is widely introduced as bread as well as porridge , the most widespread form in which the food is eaten and to this is added a variety of vegetables and legumes depending on season and location.

Three types of mills may be distinguished, household mills, custom mills and merchant mills. The household mill is normally used by those consuming wheat they have cultivated themselves. Wheat is milled in a pestle and mortar, in a hand mill.

The study is interested in the merchant mill. Aims at exploring the operation of the merchant mills in greater detail, and assessing the opportunities for increasing employment and reducing investment costs.

Merchant mills require a special purpose building, multi-storeyed to facilitate the transfer of stock from one section of the mill to another. There are nine distinct stages in a degerming merchant mill.




Stages I and 2 constitute the 'intake' section, and together with stages 7, 8 and 9 form the ancilliary (periphery) operation of the mill. Stages 3 to 6 are the core processes and comprise the 'mill house'.

Investigations show that whilst there is considerable scope for varying the degree of labour intensity in the ancilliary operations, there is less scope in the core processes, where the choice is restricted to that among essentially

similar machines of different origins, price, and quality. Nonetheless, this is an important aspect of the investment decision with implications for employment and the cost of providing a workplace.

## 9.3 Performance - Wheat Milling

There are three production lines in the Sudan (Gezira area) wheat milling factories. Table 9.1 shows that the output of these production lines are not the same. Output per day as expressed in tons of flour bran is, Gezira Glour mill (140), Blue Nile Flour mill (103) and Gezira Tenant's Union, (147). Labour input for the Gezira Flour mill is 14 skilled labourers and 160 unskilled labourers. For the Blue Nile Flour mill the figures are 15 skilled labourers and 153 unskilled labourers. And for the Gezira Tenant's Union, 9 skilled labourers and 127 unskilled labourers.

The productivities of labour and capital are also shown in table 9.1. The evaluation of the choice of technique of wheat milling emerges more clearly from the indicators in table 9.2 which are derived from the basic data.

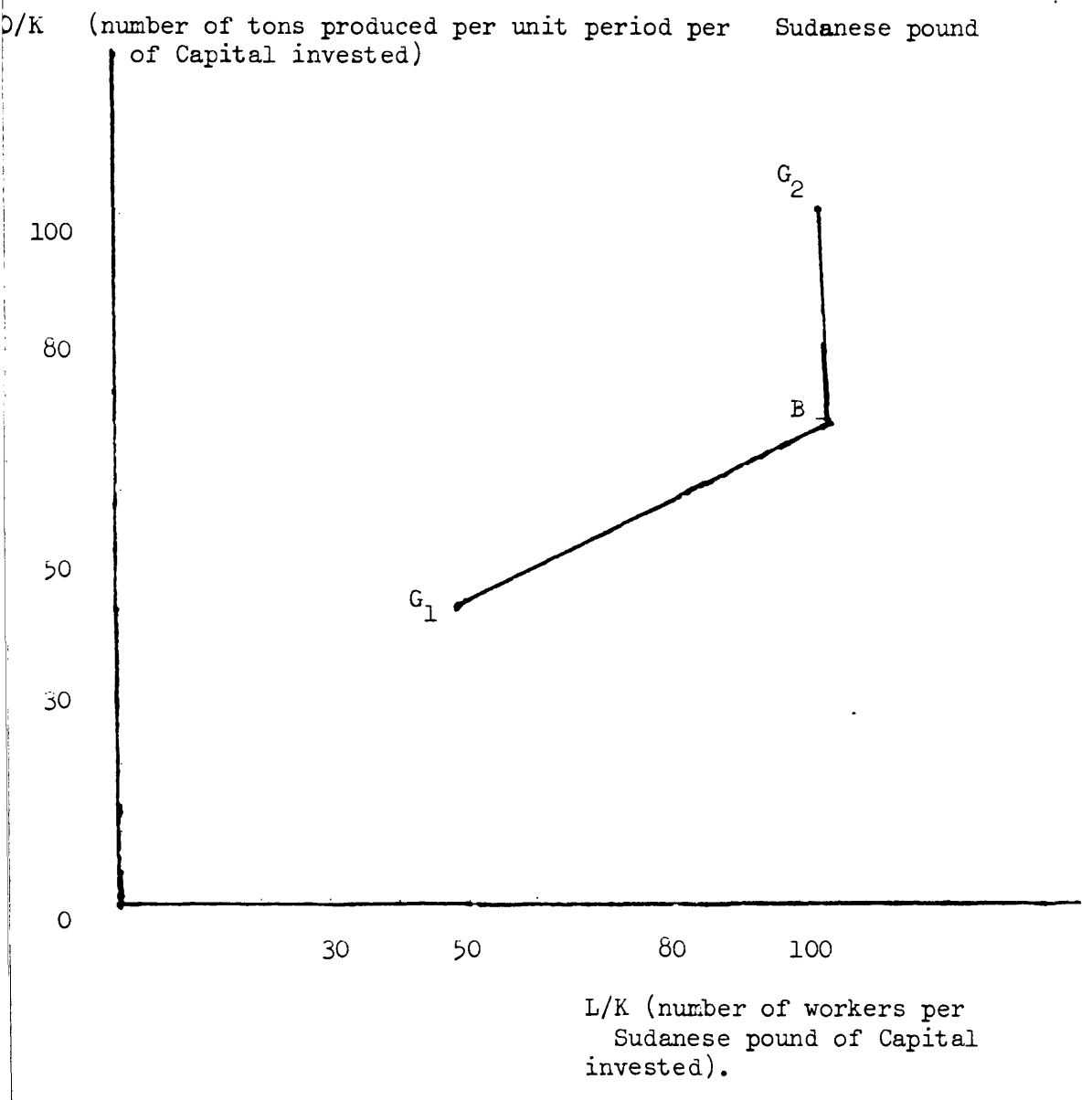
Comparisons are further facilitated in table 9.3 in which the indicators are translated into index numbers. The three mills use different ranges of techniques. Capital per worker expressed in Sudanese pounds in the Gezira Flour mills is 3391, Blue Nile Flour mill 1635, and the Gezira Tenants' Union 1910. If we compare the

Table 6.1 Factor Productivity - Wheat Flour Processing Mills

| | Gezira Flour Mill | Blue Nile Mill | Gezira Tenants' Union |
|---|---|---|---|
| Output per day (in tons) | 140 | 103 | 147 |
| Labour - skilled | 14 | 15 | 9 |
| - unskilled | 160 | 153 | 127 |
| Capital cost - Sudanese pound | | | |
| - machine | 590000 | 274698 | 259790 |
| - building | 410000 | 190892 | 180539 |
| O/K tons per Sudanese pound | 0.00014 | 0.00022 | 0.00033 |
| O/L output in tons per worker | 0.805 | 0.613 | 1.080 |
| L/K worker per Sudanese pound | 0.000295 | 0.000612 | 0.000601 |
| K/L Sudanese pound per worker | 3391 | 1635 | 1910 |
| K/O Sudanese pound per worker | 7143 | 4520 | 2296 |

Source: Own calculations based on data from Sudanese Agro-industrial Survey (1984).

Figure 9.1 Investment function: three wheat grinding mills in the Sudan Gezira




$G_1$ = Gezira Flour

B = Blue Nile

$G_2$ = Gezira Tenant's Union

three Gezira Area grinding mills, just looking at the 'capital per worker only' table 9.3, we observe that the Gezira Flour mill is two times that of Blue Nile Flour and one and three quarter times that of the Gezira Tenants Union. Furthermore the relatively labour intensive, the Blue Nile mill and the Gezira Tenants' Union provide two times higher employment per unit of investment and a very much higher employment per unit of output in comparison with the Gezira Flour mill. In comparison of output per machine the Gezira Tenants' Union mill is more than twice that of Gezira Flour mill and nearer to two times that of Blue Nile mill.

Table 9.2 shows the ratio of initial investment cost to daily output. The absolute figures indicate the total initial investment cost to daily output. The absolute figures indicate the total initial investment cost as a ratio to one day's output. What is more interesting is the differences between techniques shown in the second column, table 9.3, that is, other mills expressed as a ratio of Gezira Tenants' Union - investment cost per unit of output. The initial investment cost of the Gezira Flour mill, in relation to daily output is thus about two times that of the Blue Nile mill, and more than three times that of the Gezira Tenants' Union.

Table 9.3 also shows how output per employee varies according to the technique. It appears that the Gezira Tenants' Union maximises employment in relation to output. And very interesting it is that the Gezira Tenants' Union

Table 9.2 Output per labourer, output per machine, capital-output ratio, output and capital-labour ratio wheat milling 1982-83

| | Gezira Flour mill | Blue Nile Flour mill | Gezira Tenants' Union |
|---|---|---|---|
| output per worker | 0.805 | 0.613 | 1.080 |
| output per machine | 0.00014 | 0.00022 | 0.00033 |
| capital-labour ratio | 3391 | 1635 | 1910 |
| capital-output ratio | 7143 | 4520 | 2296 |
| worker per machine | 0.000295 | 0.000612 | 0.000601 |



Table 9.3 Output per worker, output per machine, capital-output ratio and capital-labour ratio in wheat milling 1982/83 (in index numbers) in the Gezira area of the Sudan

| | | | |
|---|---|---|---|
| output per worker | 74.5 | 34 | 100 |
| output per machine | 42 | 67 | 100 |
| capital-labour ratio | 177 | 86 | 100 |
| capital-output ratio | 311 | 196 | 100 |
| worker per machine | 49 | 102 | 100 |

Source: Own estimates based on data from the same source as Table (9.1).

mill has the highest labour productivity (1.080), when we compare it with the other two mills, Gezira Flour mill (0.805) and Blue Nile Flour mill (0.613).

Now, we intend to calculate the unit cost of production, but first let us compute the annual cost of capital and annual cost of labour. The annual capital cost is calculated by using an annuity formula, assuming an economic life of 20 years for all equipment. Buildings were assumed to have a life of 50 years for Gezira Flour mill and Blue Nile Flour mill and 40 years for the Gezira Tenants' Union. The discount rate is 10 percent throughout.

This annual investment cost is calculated, (table 10.5, by finding the equivalent constant annual payment paid for the life of the asset. The formula for converting a constant annual cash flow, B, into present value is:-

$$PV = \frac{B}{r}\left[1 - \frac{1}{(1+r)^{n}}\right]$$

where r = interest rate and n = number of years

In this case the inverse operation is performed, and an initial acquisition cost, which may be thought of as the present value of the capital cost, is converted into a constant annual cash flow, B, by dividing the initial cost by:-

$$\frac{1 - \frac{1}{(1+r)^{n}}}{\frac{1}{1}}$$

N.B. For the detail of the calculation see Appendix 7.1.

Table 9.4 Cost of Labour monthly and yearly (in Sudanese pounds)

| | Gezira Flour mill | Blue Nile Flour mill | Gezira Tenants' Flour mill |
|---|---|---|---|
| Number of employed | | | |
| skilled labour | 14 | 15 | 9 |
| semi-skilled labour | 53 | 50 | 42 |
| unskilled labour | 107 | 103 | 85 |
| Monthly price of employment | | | |
| skilled labour | 2870 | 3075 | 1845 |
| semi-skilled labour | 5035 | 4750 | 3990 |
| unskilled labour | 6955 | 6695 | 5525 |
| Total price employment(month) | 14860 | 14520 | 11360 |
| Price of labour (yearly) | 178320 | 174240 | 136320 |

Table 9.5 Annual (capital) investment cost in Sudanese pounds

| | Gezira Flour mill | Blue Nile Flour mill | Gezira Tenants' Flour mill |
|---|---|---|---|
| 1. Initial capital | | | |
| machine | 590000 | 274698 | 259799 |
| building | 410000 | 190892 | 180539 |
| 2. Discount rate | 10% | 10% | 10% |
| 3. Assumed length of life in years | | | |
| machine (yrs) | 20 | 20 | 20 |
| building(yrs) | 50 | 50 | 40 |
| 4. Annual investment cost | | | |
| machine | 69297 | 32264 | 30514 |
| building | 41352 | 19253 | 18461 |
| Total annual capital cost | 110649 | 51517 | 48922 |

Source: Table (9.4) and Table (9.5). Own calculations based on data from the same source as Table (9.1).

Table 9.6 Annual Cost of Capital and Labour and Annual Output of Three Wheat Mills

| | Gezira Flour Mill | Blue Nile Mill | Gezira Tenants' Union |
|---|---|---|---|
| Annual Labour Cost | 128320 | 174240 | 136320 |
| Annual Capital Cost | 110649 | 51517 | 48922 |
| Annual Output (tons) | 42000 | 30900 | 44100 |

Table 9.7 Unit Cost of Production - Wheat Milling

| | | | |
|---|---|---|---|
| Labour | 4.25 | 5.64 | 3.09 |
| Capital | 2.63 | 1.67 | 1.11 |
| Total | 6.88 | 7.31 | 4.20 |

Source: Table 9.6 and table 9.7 - Own calculation based on data from the same source as table 9.1.

The unit cost of output from the three wheat milling techniques are shown in table 9.7 and are derived at current factor prices and actual capacity utilisation. Hence, at current prices the relatively optimal technique is Gezira Tenants' Union flour mill.

## Groundnut Decorticating

### ٩.٤ Introduction

In this section of the chapter the investigation and analysis is on choice of technique of groundnut decorticating. The four groundnut decorticators in the Gezira Area of the Sudan are, Medina Arab, El Hosh, Goz Kabro and Bagier Dec. Among themselves they process about 40 per cent of the total capacity of groundnuts decorticated in the Sudan. And at the same time, these four decorticators are well located to maximise the use of local materials and human resources; since Gezira is the main area of groundnut production.

The groundnut decorticators work seasonally, i.e. 75-90 days a year during the Gezira groundnut harvest months. Groundnut decorticators use mostly unskilled labour, and additional advantage is that most of the decorticating machines are produced locally and at a cheaper price than the imported machines. Because the work is seasonal and on slack period (season), perhaps, it fits the off-farm work schedule of the tenants and the agricultural labour in the Gezira area.

After briefly discussing the technology of decorticating, the concentration is first on identifying the range of actual technique in use in groundnut decorticating in the Gezira Area of the Sudan. Secondly, investigating and analysing productivities of labour and capital and thirdly looking at the unit cost of production and general employment implications.

## 9.5 The technology and production process of groundnut decorticating

This consists of an oblong steel box approximately 2 feet long by 1 foot wide and 1½ feet deep, open at the top and bottom. Across its centre and towards the top is fixed a 1" diameter steel shaft, on which swings a pair of steel plates mounted on a cast iron bearing. Between these plates are placed at intervals, on an arc, four cast iron shoes or beater bars, which have blunt spikes on their underside.

The semi-rotary action of these shoes is affected by swinging them backwards and forwards using a 3 feet handle. The shoes swing in an arc over a wire mesh screen, fixed to curve through 180° C, the shoes can be adjusted nearer to the screen to make the decortication action more severe if required. The nuts are decorticated by the shoe action rolling and pushing them through the wire mesh screen. There are usually available, as an extra, four different mesh sizes of screen with 3/8", 7/16", 1/2" and 5/8" square holes.

## 9.6 Performance - groundnut decorticating

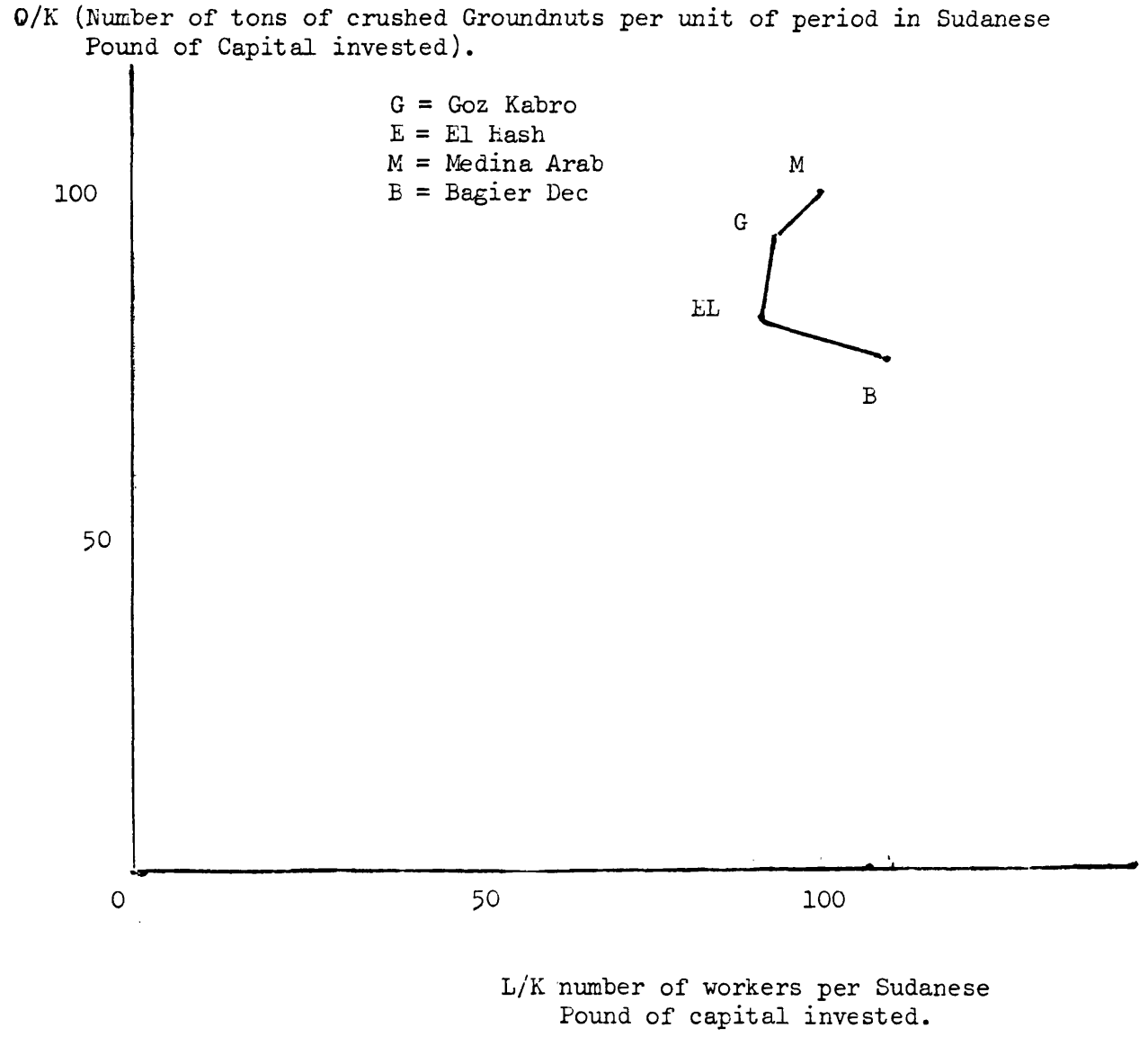
Table 9.8 shows that the four groundnut decorticators in the Gezira area of the Sudan produce not substantially different rates of output per hour in terms of tons. The output per hour as expressed in tons are, Medina Arab 4.4, El Hosh 4.0, Goz Kabro 4.75 and Bagier Dec 3.66. Labour input (including skilled and unskilled labour), Medina Arab 198, El Hosh 210, Goz Kabro 215, and Bagier Dec 239.

Table 9.8 Factor productivity of groundnut decorticators in the Gezira Area

| | Medina Arab | El Hosh | Goz Kabro | Bagier Dec |
|---|---|---|---|---|
| Output per hour in tons | 4.4 | 4.0 | 4.75 | 3.66 |
| Labour | 198 | 210 | 215 | 239 |
| Capital<br>machine<br>building | 197757<br>73143 | 230360<br>89640 | 230400<br>89600 | 226300<br>83700 |
| O/K Output per Sudanese pounds | 0.000016 | 0.000013 | 0.000015 | 0.000012 |
| O/L Output in tons per worker | 0.022 | 0.019 | 0.022 | 0.015 |
| L/K worker per Sudanese pounds | 0.0010 | 0.00091 | 0.00093 | 0.0011 |
| K/L capital (machine) per worker | 999 | 1097 | 1072 | 947 |
| K/O ratio of initial investment cost to hourly output | 44945 | 57590 | 48505 | 61831 |

Source: Own calculations based on data from Sudanese Agro-industrial Survey 1984.

Figure 9.2 Investment function of the four Groundnut Decorticators in the Sudan Gezira



The labour and capital productivities are also shown in table 9.8. The investment per man (expressed in Sudanese pounds), are Medina Arab 999, El Hosh 1097, Goz Kabro 1072 and Bagier Dec 947. The evaluation of the choice of technique of groundnut decorticators emerges more clearly from the indicators in table 9.9 which are derived from the basic data. Comparisons are further facilitated in table 9.10 in which the indicators are translated into index numbers. The machines in use by these four decorticators involve, more or less, similar acquisition cost per worker, of course with slight differences in prices. For example machines in use by El Hosh (1097), have an acquisition cost per worker nearly 1.2 times that of Bagier Dec (947).

Table 9.10 indicates initial investment as a ratio of hourly output. At the same time, difference between techniques is also shown in the same table, that is, other mills expressed as a ratio of Medina Arab. The investment per unit of output of Bagier Dec is 1.4 times that of Medina Arab and El Hosh investment per unit of output is 1.3 times that of Medina Arab.

Table 9.10 also shows that output per man varies slightly according to the technique. Medina Arab and Goz Kabro both have the highest labour productivity when we compare them with the other two, El Hosh and Bagier Dec. In comparison of output per machine Medina Arab is 1.3 that of Bagier Dec and 1.2 that of El Hosh. In comparison of worker per machine, Bagier Dec and Medina Arab are slightly higher than that of either El Hosh or Goz Kabro (see table 9.10).

Table 9.9 Output per labourer, output per machine, capital-output ratio, and capital-labour ratio in groundnut decorticators in the Gezira Area of the Sudan (1982/83)

| | Medina Arab | El Hosh | Goz Kabro | Bagier Dec |
|---|---|---|---|---|
| Output per worker | 0.022 | 0.019 | 0.022 | 0.015 |
| Output per machine | 0.000016 | 0.000013 | 0.000015 | 0.000012 |
| Capital - labour ratio | 999 | 1097 | 1072 | 947 |
| Capital - output ratio | 44945 | 57590 | 48505 | 61831 |
| Worker per machine | 0.0010 | 0.00091 | 0.00093 | 0.0011 |

Table 9.10 Output per worker, output per machine, capital - output ratio and capital - labour ratio in groundnut decorticators (in index numbers) in the Gezira Area of the Sudan.

| | | | | |
|---|---|---|---|---|
| Output per worker | 100 | 86 | 100 | 68 |
| Output per machine | 100 | 81 | 94 | 75 |
| Capital - labour ratio | 100 | 110 | 107 | 95 |
| Capital - output ratio | 100 | 128 | 108 | 138 |
| Worker per machine | 100 | 91 | 93 | 110 |

Source: Table (9.9) and Table (9.10). Own estimates based on data from the same source as Table (9.7).

Table 9.11 Annual Cost of Capital and Labour and Annual Output in Four Groundnut Decorticator Plants

| | Medina Arab | El Hosh | Goz Kabro | Bagier Dec |
|---|---|---|---|---|
| Annual Labour Cost | 116184 | 123684 | 126324 | 141324 |
| Annual Capital Cost | 29841 | 34886 | 34886 | 34151 |
| Annual Output (tons) | 10560 | 9600 | 11400 | 8784 |

Table 9.12 Unit Cost of Production, Groundnut Decorticators

| | | | | |
|---|---|---|---|---|
| Labour | 11.00 | 12.88 | 11.10 | 16.01 |
| Capital | 2.83 | 3.63 | 3.06 | 3.89 |
| Total | 13.83 | 16.51 | 14.16 | 19.90 |

Source: Table 9.11 and table 9.12, own calculation based on data from the same source as table 9.8 .

The unit cost of production from the four groundnut decorticators techniques are computed and presented in table 9.12. It shows that unit cost of output at actual capacity utilisation and existing factor prices are less in Medina Arab and Goz Kabro mills than it is in El Hosh and Bagier Dec. Thus, when we consider these four techniques at current factor prices Medina Arab and Goz Kabro have optimal technique.

## 9.7 Summary and Conclusion

This chapter has examined choice of technique in wheat milling and groundnut decorticater plants in the Sudan on the basis of a survey carried out during the field work phase of the research in early 1984.

The results from the inquiry reveal that the most investment intensive technique, the Gezira flour mill, requires more than two times as much investment per labour as that of Blue Nile flour and above one and three quarter times that of Gezira Tenants' Union. It also involves more investment in relation to output, for example, the initial investment cost of the Gezira Flour mill, in relation to daily output is more than three times that of the Gezira Tenants' Union, and about two times that of the Blue Nile mill. In a comparison of labour productivity between the three wheat mills, we find that Gezira Tenants' Union has the highest labour productivity. This means that output per worker is higher in the less investment intensive plant of

Gezira Tenants' Union.

Above, we presented a review of the results from the survey of wheat milling. We continue the discussion by giving a summary of the results of the examination of choice of technique of groundnut decorticators.

The evidence from the survey shows that the relatively more investment-intensive technique, El Hosh mill, needs nearly 1.2 times as much investment per worker as that of Bagier Dec decorticator. The investment per unit of output of Bagier Dec is 1.4 times that of Medina Arab and El Hosh investment per unit of output is 1.3 times that of Medina Arab. The comparison of output per man shows that Medina Arab and Goz Kabro have the higher labour productivity than that of El Hosh and Bagier Dec.

Examination of technology employed by 19 Sudanese agro-firms establishes first, the existence of a choice of technology, second, that the technique actually used in the Sudan tends to more capital intensive than would be expected in the Sudan conditions, and third, results also show variations (unit cost of production and employment creation) between plants in the same industry (see chapter 12). Once plants and equipment have been purchased capacity has been installed and it is already operating, then the question is are Sudanese existing industrial capacity fully utilised , and if not why not? And what are the causes for low capacity utilisation. The following chapter pursues the investigation and sees if there is a possibility of increasing Sudanese industrial employment through fuller utilisation of existing capacity.

# CHAPTER TEN

# CAPACITY AND EMPLOYMENT CREATION

## 10.1 Introduction

As a general objective of encouraging employment creation the three previous chapters gave results of an inquiry on the choice of technique of 19 Sudanese agro-firms. This chapter examines capacity and employment creation. Section 2 establishes the actual level of utilisation of capital invested on the basis of the firms surveyed in 1984. Also a distinction is drawn between two types of excess capacity. In section 3 supply input shortages are identified as major cause for low capacity utilisation. Section 4 gives an estimation of employment creation opportunities potential in the firms surveyed, with optimum shift work pattern. And finally in section 5, suggestions of measures are made to eliminate or reduce shortages of input supply and correction of distortions in factor prices.

## 10.2 Conceptual Issues

### 10.2.1 Excess Business Capacity

Full capacity utilisation in this study is considered from the point of view of optimisation of the operating time identical with the optimum level of utilisation of capital invested from the point of view of entrepreneur and that of the national economy.[1] The full-capacity number of shifts is defined as that judged to be normal in an industry, when due allowance is made for time required for the maintenance and repair of machines or

any other necessary activity. If working three eight-hour shifts overstrains the machines, the optimal number of shifts per day will be less than three, the exact number being determined on technological grounds according to the nature of the industry.

In the present chapter we assume that plant and equipment have been purchased, capacity has been installed, and it is already operating; and that it is possible to vary the number of shifts actually operated. Why, then in the Sudan, is existing industrial capacity not fully utilised? i.e. only part of this capacity is actually utilised. Can remedying the deficiencies in supply and demand help to raise the rate of capacity utilisation? It will be shown that it is primarily the supply input constraint that is mainly responsible for the under-utilisation of existing industrial capacity in the agro-industrial sector of the Sudan.

There are two sources of excess capacity which hinder full use of capacity utilisation. They are excess business capacity and excess social capacity. There is excess business capacity because firms cannot reach their targets of full capacity utilisation and the targets.[2,] A survey of 19 Sudanese agro-industries reported that the main causes of their excess business capacity are supply input shortages, such as power, skilled labour, foreign exchange and local and imported materials shortages.

Excess business capacity in terms of the optimum utilisation of the capital invested is obtained by asking the entrepreneurs to state their normal number of hours planned by the entrepreneur. Full capacity here represents the optimum production aimed at by the entrepreneur with his stock of fixed capital in normal

condition of operation. To estimate the rate of utilisation of business capacity in terms of production, we asked the 19 Sudanese firms covered by the survey what proportion of the full capacity of the factory has been utilised? The survey of 19 Sudanese firms showed that the average present level of capital utilisation based on hours of operation (time intensity approach), is 27 per cent. The average 'normal' number of hours of operation for the 19 Sudanese firms covered by the survey is 3709 hours per year or 42 per cent of the available time (8760 hours), equivalent to 13 hours per day, five and a half days per week and 52 weeks per year.

Table 10.1 Estimation of Rate of Utilisation of Business Capacity

| | Hours covered per year | Percentage |
|---|---|---|
| Average normal hours operation | 3709 | 42 |
| Average actual hours operation | 2319 | 27 |
| Excess business capacity - gap between the two | 1390 | 15 |

Source: Own calculations based on data of Sudanese Agro-industrial Survey(1984.)

Taking the sample of 19 Sudanese firms the under-utilisation of capacity caused by excess of business capacity, i.e. caused by the shortages of supply inputs is on average 1390 hours per year per firm surveyed.

Table 10.2

A Comparison of three African Countries of

average actual hours of operation per year as

a percentage of maximum capacity

| African countries | Actual (Average) hours of operation per year | Percentages of maximum capacity of (8760) hours of operation per year | The lowest utilisation of a firm operating in terms of percentages |
|---|---|---|---|
| Nigeria* | 3187 | 36% | 19% |
| Marroco** | 2765 | 32% | 15% |
| Sudan | 2319 | 27% | 12% |

Source: Own estimates (Sudan) based on data from the same source as Table (10.1).

Nigeria* calculation by G.C. Winston. 'Increasing Manufacturing Employment through fuller utilisation of Capacity in Nigeria.'

Marroco** calculated by N. Phan-Thuy, 'Employment, Promotion through fuller utilisation of installed Industrial Capacity.'

Both G.C. Winston and N. Phan-Thuy articles are on the Book- Phan Thuy (ed) others,'Industrial Capacity and Employment Promotion', Farmborough-Gower, 1981.

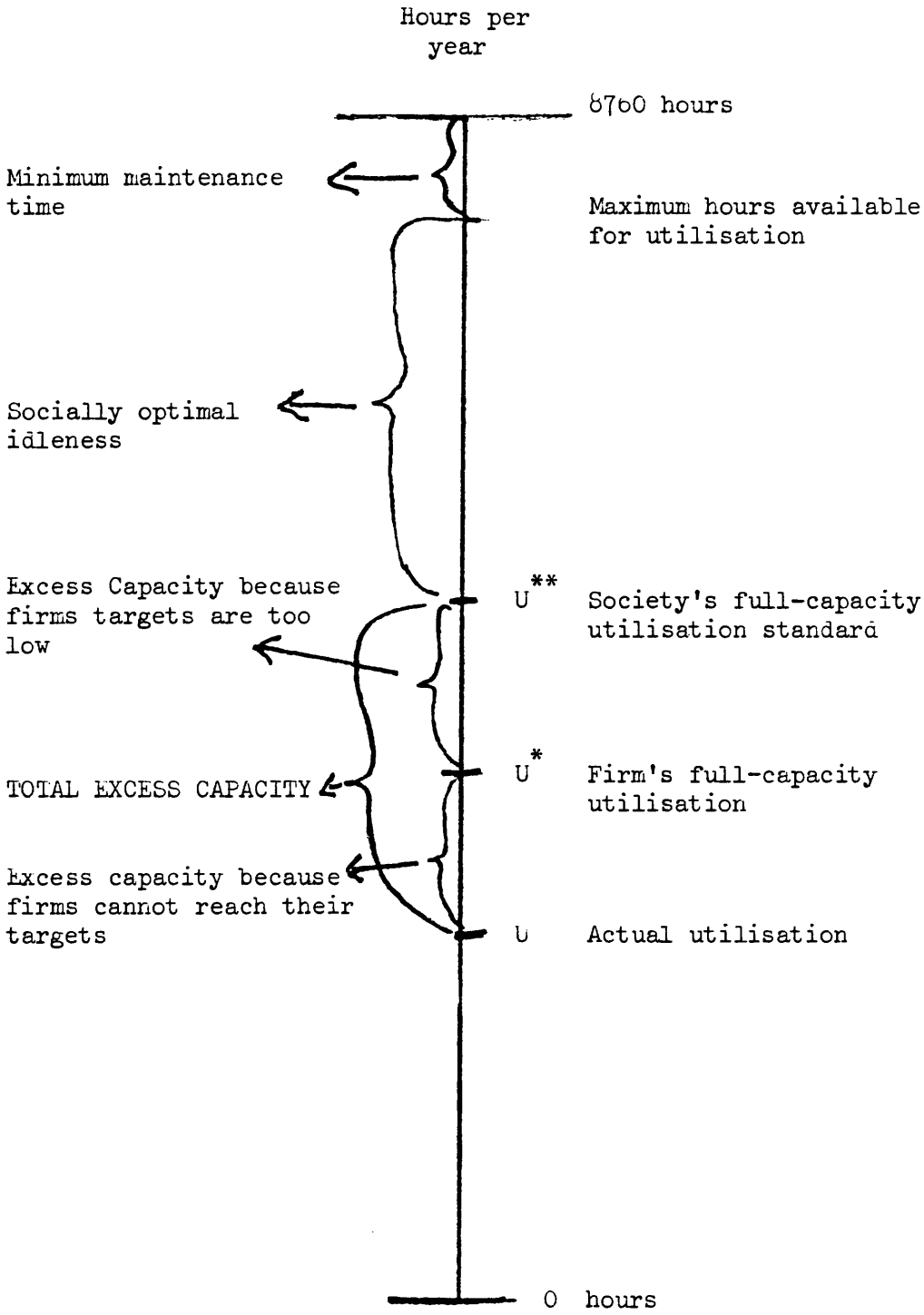
### 10.2.2 Excess Social Capacity

Excess capacity is not only due to business, but there is also excess social capacity. The sources of intended or structural under-utilisation of capital leading to excess of social capacity is because firm targets are set too low to reflect society's real economic scarcities.[3] We have to examine the causes of the distortions in prices of factor of production in Sudan particularly in respect of capital and labour and that will indicate to us the likely effect of distortions on the intended level of utilisation. We will see that these structural inbalances are responsible for the social excess capacity that results from the fact that the entrepreneurs have fixed their production target too low.

#### 10.2.2.1 Distortions in the Cost of Fixed Capital

The price of capital is determined by the rate of interest, the rate of depreciation, the cost price of the equipment and the rate of exchange if the equipment is imported. According to Betancourt[4], the effect of a change in th price of capital on the share of capital cost in the total cost (capital and labour) of an operation with one shift is critical when it comes to establishing the effect of distortions in the price of capital on the fixing of production targets by the entrepreneur and so on the determination of business capacity in relation to

Figure 10.1




Utilisation and excess capacity as time

social capacity. He has confirmed that with a production function of the constant elasticity substitution (CES) type and a substitution elasticity of less than one, the lowering of the price of capital encourages the entrepreneur to have production targets (business capacity) that are below the level of the social capacity.[5] In fact, the lowering of the price of capital decreases the capital share and makes new investments more profitable, while by increasing the ratio of the cost of shift work to the cost of single shifting, it reduces the profitability of shift work. It is this that encourages entrepreneurs to make new investments rather than to employ an additional shift in an existing plant and largely explains social excess capacity.

In the Sudan, during the period of 1956-1980, the following measures and incentive policies were taken to encourage investments.[6] Industrial establishments were exempted from business profit taxes for five years from the commencement of production, industrial entreprises were also exempted from payments of custom duties, surcharge and any other duties relating to machinery, equipment, spare parts and raw materials. Such incentives, obviously, encourage enterprises to prefer to set up new plants and expand productive capacity even when the capacity of the existing plant is not yet saturated.

Since the Sudanese capital market is restricted, the actual rate of interest does not reflect the opportunity cost of capital. In fact, in the early eighties the actual interest rate called for by the

Sudan Industrial Bank is 10 per cent. The bank also practices a selective credit policy, granting loans mainly to large firms. Long-term credits are harder to get for small local manufacturing enterprises that are labour-intensive rather than capital-intensive.

Hence, to sum up, the investment promotion measures, the comparatively favourable rate of banking loans and the easier availability of long-term credit to large firms encourage entrepreneurs, in the Sudan, to invest in new factories of ever greater capacity although existing capacity is not fully utilised.

10.2.2.2 Distortions in the Cost of Labour

The social laws and the activities of the trade unions help to keep the cost of labour at a higher level than would have been reached in the developing countries, where with high unemployment and underemployment the real price of labour, reflecting its opportunity cost would normally be lower. Minimum wages, night and week-end bonuses, pay for over time, the costs of dismissal and the various social charges by increasing the cost of labour, also favour capital-intensive techniques despite the labour surplus. They can discourage shift work where the cost of a second shift is too high to be profitable.

In the Sudan, however, although our survey showed that 75 percent (see table 10.5) of the firms covered

by it operate with one shift per day, this does not seem due to the Sudanese labour legislation on the minimum wage (minimum wage is set so low that most workers are paid more). On the other hand, the shortage of skilled labour and particularly of middle-level management to supervise the workers and labour legislation that assured workers permanent employment after 60 days with the firm (i.e. the inability of the firm to dismiss or penalise workers for absenteeism or low productivity after the initial 60 days) have pushed the entrepreneurs into having a maximum of machinery and a minimum of labour. Accordingly, if production should increase in the coming five years only 7 of the 19 firms covered by the survey would prefer to add a second shift and use the same machinery, whereas the others would buy new machinery with a few additional workers and maintain one shift per day.

We have shown above the effect of distortions, particularly of capital and labour, on intended level of utilisation in Sudan agro-firms and that indirectly encourages entrepreneurs to have production targets (business capacity) that are below the level of social capacity. In the following section 3 it will be shown that supply input shortages are the major causes for under utilisation of existing industrial capacity.

## 10.3 Supply Input Shortages

Generally, low capacity utilisation characterises the agro-industries in the Sudan. A survey by the researcher of 19 agro-industry firms, of which about two thirds were publicly owned, shows that 74 percent of the firms were operating below 50 percent capacity. In the public sector, the share in this category rose to 85 percent. The low rates of capacity utilisation results from shortages of necessary production inputs including electricity, transportation, labour, shortage of foreign exchange, and both domestic and imported material inputs.

### 10.3.1 Shortage of Electricity Supply

Eighty percent of the surveyed plants reported a shortage of electricity supply and cuts as one of the main cuases of undercapacity utilisation. Electricity supply is inadequate to meet the demand put upon it, and industrial use is among the first to be rationed through power cuts. The Public Electricity and Water Corporation (PEWC), is the sole supplier of commercial electricity, and its reliance upon hydroelectric capacity with a great seasonal variation has led to severe shortages during the summer months. During supply cuts, residential service is given priority. Khartoum industrial plants were without PEWC

electric service for six weeks during the summer of 1980; in addition, unannounced cuts have occurred throughout the year, and plant machinery has been damaged by voltage variations.

In Wad Medani power failures amount to a total of 5-7 hours per week during the dry season but it is also reported that electricity cuts reach 15 hours per week during the rainy season.

PEWC has not enlarged it generating capacity as much as had been planned in many areas, which has left some plants dependent upon expanded service without power for as long as three years. The case in point is the 72,000 spindle spinning factory set up in Port Sudan which has remained idle for three years, no power to run it. Long-distance transmission from the hydroelectric dams to the consumers has the added effect of periodic supply interruptions and voltage variations.

Electricity power generation is of vital importance to all industries, and some private firms reported to have standby generators for use during the electricity cuts and interruptions. Standby generators need oil which is also in a short supply and also standby generators contribute to increasing the unit cost.

### 10.3.2 Skilled industrial labour in short supply

A feature of skilled labour markets in the Sudan is that of major and growing shortages. This is related in a direct way to the emigration of labour to oil rich Gulf states and secondly related to the system of education and training. 75 per cent of

Table 10.3 Sudan: Reasons for chronic unutilised capacity (Survey of 20 Agro-industries in the Sudan)

| Reasons for un-utilised capacity | Relative importance (severity) of each factor in percentages |
|---|---|
| 1. Power supply shortages | 80 |
| 2. Skilled labour shortages | 75 |
| 3. Shortage of raw materials (local and imported) | 65 |
| 4. Foreign exchange shortage | 60 |
| 5. Transport | 50 |
| 6. Working capital | 35 |
| 7. Administrative delay and inefficiency | 25 |
| 8. Insufficiency of demand | 15 |

Source: own calculations based on data from the same source as Table (10.1).

the surveyed firms reported shortages of skilled industrial labour as a major constraint contributing to under-utlisation of capacity.

The structure of education and other training has much to answer for as regards skillled labour shortages. Government recruitment policies, among other things, had operated to make liberal art education much more attractive in terms of job prospects than technical training. A higher level of education system remained heavily biassed in favour of producing humanities

graduates with no particular technical skill. Furthermore, the preference for university education rather than technical and vocational training is still widespread, so that the universities continue to produce relatively large numbers of graduates while crucial and necessary middle level vocational and technical skills are not developed.

The situation of shortage of skilled industrial labour has been made worse by emigration to the oil rich Gulf States of trained technicians graduating from the few technical institutes in the Sudan. The oil rich Gulf States have been hiring away (since around 1975), skilled Sudanese labour and managers with the promise of higher salaries, reaching ten to fifteen times the salaries they earn at home. For example, weaving firm reports losing 25 of 29 financial and accounting staff numbers to the Gulf States in the last seven years.

Surveyed firms report high scarcity of skills - shortages of engineers, accountants and technicians. Other major shortages are of mechanics, electricians, plumbers, welders,carpenters, artisans, book-keepers and typists.

Absenteeism and high turnover is a pervasive problem. High turnover is mainly related to the emigration of skilled and semi-skilled labour to the oil rich Arab countries. Typically unskilled or semi-skilled labour stay in the factory until they have acquired some experience and then depart. In some of the textile firms a turnover of 40 to 50 per cent per year was registered.

### 10.3.3 Foreign Exchange Supply Shortage

Shortages and delayed allocation of foreign exchange, which became very serious by the 1970's, constituted major factor, for low levels of capacity utilisation in the Sudanese agro-firms. In fact, 65 percent of those surveyed reported foreign exchange supply shortage as a cause for the under-utilisation of capacity (see table 10.3). They resulted in irregular and insufficient supplies of imported raw materials, fuel and spare parts. The shortages of foreign exchange necessitated foreign exchange control and import licencing which limited and delayed importation of necessary replacement parts and inputs.

The allocation pattern of foreign exchange among firms was biased against spare parts and imported raw materials. In priority, foreign exchange made available for capital good imports for newly licenced industrial units and capacity expansion of the existing ones. What remains is then, allocated among firms for use towards imports of spare parts, fuel and raw materials. Obviously, this gave new firms and expansion of capacity of existing firms a priority over current uses. However, it is difficult to justify this priority in an industrial sector plagued by excess capacity, caused, in the main, by factor exchange scarcity.

Foreign exchange shortages could be attributed to a number of factors. Public investment undertaken during the 1970's led to a substantial increase in imports on both capital and intermediate goods. At the same time, export volumes declined sharply, mainly because the public investment programme focused primarily on development of new projects and failed to make adequate provisions for maintenance of existing export-oriented public irrigation schemes. Also export taxation and excise duties on primary exports were, firstly, disincentive for the producers of primary exports and secondly (taxation) add to the cost of potential exports and reduce their competitiveness on world markets.

The substantial discrepancy between expenditure on imports and exports earnings led to a very rapid increase in the level of external borrowing. Inappropriate selection of public projects and problems encountered in implementing those projects have, generally, made the new investment incapable of generating the anticipated returns in a timely manner. Consequently, the country could not meet the rising debt service obligations of the huge foreign debts and arrears began to accumulate. After 1977, severe shortages of foreign exchange led to a fall in import volume and the growth momentum of the 1970's which was based, in large part, on external borrowing, could no longer

be sustained and the whole economy started to stagnate. Very few new firms were coming into existence and the problem of the under-capacity utilisation of existing firms was aggravated even further.

A classical example of the economic policy was the subsidising of urban living at the expense of the farmers. Exports like cotton, meat and livestock were taxed and subjected to unfavourable exchange rates but imported petrol, sugar and wheat were subsidised heavily as seen in table 10.4. Until recently, Sudan had the cheapest petrol price of any non-oil producing country. In the six years between 1973 and 1979 Sudan imported over US$ 300 million worth of vehicles (60% of them passenger cars) and US $ 400 million worth of spare parts and tyres. The result was as even ex-president Numerie once publicly complained, "two-thirds of all petroleum products being consumed in the capital".[7]

Table 10.4 SUDAN: Central Government Subsidies

(LS million)

| | 1976/77 | 1977/78 | 1978/79 | 1979/80 | 1980/81 |
|---|---|---|---|---|---|
| PETROLEUM | - | - | 3.2 | - | 48.0 |
| WHEAT AND SORGHUM | 7.9 | 5.8 | 0.3 | - | 10.2 |
| SUGAR | - | - | - | - | 3.6 |
| Public Corporation | 2.0 | 4.4 | 6.3 | 7.0 | 11.0 |
| Total | 9.9 | 10.2 | 9.8 | 7.0 | 72.8 |

Source: Ministry of Finance and World Bank Estimates 1982

10.3.4 Transport constraints

Transport difficulties have caused irregular and unpredictable supply of petroleum products, other imported inputs and domestically produced raw materials. Rail service is undependable, especially for industries in outlying areas, and has much of its capacity committed to consumer goods transport. Road transport is the most reliable, but also the most expensive option.

Sudan does have a conveniently placed 1,300 mile railway crossing the country from east to west. It was Africa's longest railway when it was completed by the British in 1906. At present the railway is in a shambles. 'When Numeiri was ruling Sudan, he witheld resources from the railway in order to put pressure on the railway workers' union' which led to the opposition to him in 1970'. At any one time only 20 locomotives, some of them coal-fired relics of the 1920s, actually work; another 40 sit idle awaiting spare-parts. The tracks are badly worn; so that the trains have to go very slowly to avoid derailment.[8] Secondly, Numeiri's Government last year turned down an offer from the World Bank to refurbish the railway system because of the Bank's condition that 40 expatriate managers must be brought in.[9] British Rail advisors in Sudan reckon that, with a recent (May 1985) grant of $ 7.6 million from the EEC, they should be able to get the railway into shape.[10] Some are skeptical of the too little EEC grant and argue since the irresponsibility and complete neglect (of the Government) to the railway are the accumulation of many years, the damage done is chronic and the state of the railways are in a shambles; non-cosmetic refurbishment, they argue might need around $160 million.[11]

## 10.4 An Optimum (desirable) shift work pattern and the employment creation opportunities in the Sudan

### 10.4.1 Definition and factors influencing the choice of optimum shift work pattern

Most of the Sudan industrial sector use a single shift system, leaving expensive equipment idle most of the time, though technically possible, it is unduly costly. The discussion will proceed with the hypothesis that through better and fuller utilisation of existing capacity by the use of shift work, this eventually leads to greater employment creation and output increase.

The choice of shift work pattern is based mainly upon economic consideration and on the theoretical premises and experiences of other countries. An attempt is made to define the optimum amount of shift work.

"The optimum shift work pattern is that corresponding to a situation that guarantees the rational utilisation of equipment and human resources and lying somewhere between one and three shifts (the theoretical maximum assuming eight hours). [12]

The optimum shift work pattern may serve two practical purposes;

(a) it may be used as a yardstick against which the actual degree of extensive capacity utilisation can be measured.

(b) it may also be used as a target indicator. If the optimum has been defined for each country industry and the actual coefficient is lower, special measures might have to be taken

to increase the actual shift coefficient up to the optimum.

The search for factors influencing the optimum pattern can be based upon the analysis of advantages and disadvantages of multiple shift working.

By working additional shifts two types of economic advantages may be achieved in developing countries.

(1) in conditions of surplus labour industrial production and employment can be expanded with the same fixed assets.

(2) Cost reductions may be achieved through a reduction in capital costs (interest and depreciation changes) per unit of output. Where fixed costs are a heavy element in total cost the introduction of shift work can play a very important role in reducing the total cost. Also,in conditions of scarcity of capital and labour surpluses(the case of the Sudan), as with many LDCs, shift work operations may lead to particularly important economic benefits. This is due to high interest rates and different relative prices of capital and labour.

Human problems of shift work in developing countries.

The conditions of work and life in less-developed countries differ from those prevailing in developed ones, at least in five respects:

(1) there are different climatic conditions; work is performed mainly in tropical conditions;

(2) social infrastructures (public and private transport and other communal facilities) are less developed.

(3) there is a lack of industrial tradition and attitudes of workers towards shift working.

(4) there is lack of proper housing and difficulty in obtaining an undisturbed rest during the day time for night workers.

(5) there is poor supervision on the second and third shifts due to lack of supervisory staff.

Table 10.5 Shifts per day and days per week of operation of some part of the plant in the Sudan

| Shifts per day: | Number of Firms | Percent of Sample |
|---|---|---|
| one | 15 | 75 |
| one to two | 5 | 25 |
| three | - | - |
| Days per week | | |
| Five | 11 | 55 |
| Five to six | 9 | 45 |
| Six | - | - |
| Seven | - | - |

Source: Own estimates based on data from the same source as Table(10.1).

Table 10 .5 shows the frequency distribution of firms by shift and by number of days per year. Table 10 .5 reveals that 75 per cent of the Sudanese firms surveyed work between one and two shifts a day. Three shifts a day is unthinkable. The usual days per week are five (55 per cent) or five to six (45 per cent).

10.4.2 An optimum shift work pattern and employment creation opportunities in the Sudan

This section of the chapter focusses on (1) to what extent employment could be expanded within the framework of double-day shift system and (2) on the method of measuring employment creation opportunities with an optimum shift work.

In the Sudan single shift system is prevailing in the majority of industries. Thus, there are great opportunities for employment expansion through better utilisation of capacity on the second shift; ie, within the framework of a double day shift system.

The emperical inquiries in both industrial and developing countries on attitudes of workers towards different shift systems revealed that the double day shift system was the most acceptable for the majority of workers; it appears to be the least demanding shift schedule, and creates less disturbance to quantity and quality of sleep and to the social life of workers.[13]

In the Sudan, like many less developed countries, suffering from structural unemployment and underemployment and a short supply of capital, a double shift working may play an even more important role than is the case for advanced countries.

Assuming that in the Sudan the supply input shortages and constraints and distortions in the price of factor of productions are either eliminated or at least minimised; in the face of massive unemployment and underemployment in the Sudan the top priority has to be to use any available resources for employment creation. And one method of employment creation is the optimum use

of existing capacity utlisation. And other considerations, except efficiency, economic and creation of employment, at this lower stage of Sudan's development, are but a luxury.

It follows from the discussion, that consideration and the experience of some countries that the industry optimum or desirable shift work pattern for industries with a non-continuous production process is very frequently considered to be approximated to a two-shift system, that is, when the shift coefficient ranges between 1.6 (low point) and 1.8 (high point)[14]. It means that modern industrial equipment should effectively operate on average at least 12.8 (1.6 x 8) to 14.4 (1.8 x 8) hours per working day, assuming eight hour shifts.

Then the actual estimation is as follows; knowing the actual shift coefficient (S) and the desirable (or optimum) level ($S_o$) for any enterprise or industry, the potential of employment creation (in percentages) due to better capacity utilisation (Ep) could be calculated by using the formula:[15]

$$Ep = \left( \frac{S_o}{S} - 1 \right) \cdot 100$$

In the Sudan, at present, because of the chronic under-utilisation of capacity, the gap between the optimum shift coefficient and the actual level seems to be much greater (see Table 10.6). At the same time, if the supply input shortages and constraints are, somehow, minimised, the potential for employment creation and production increase are very high.

Table 10.6 Production and Employment Creation Potential with Optimum shift coefficient in five agro-industries in the Sudan

| Branch of industry (Average) | Actual shift coefficient | Production and Employment Creation Opportunities % with optimum shift coefficient of | |
|---|---|---|---|
| | | 1.6 | 1.8 |
| Tanneries | 1.00 | 60 | 80 |
| Spinning | 1.06 | 51 | 69.8 |
| Weaving | 0.90 | 78 | 100 |
| Wheat milling | 1.15 | 39 | 56 |
| Groundnut Decorticators | 1.30 | 23 | 38 |
| Oil Seed processing | 1.00 | 60 | 80 |

Source: Own calcuations based on data from the same source as Table (10.1).

Table 10.6 shows that using the 1.6 optimum shift coefficient, on average employment creation and production expands by more than 50 per cent of the agro-industries surveyed. Similarly, using the 1.8 optimum shift coefficient, on average employment creation and production expands by 70 per cent.

Using the same table 10.6 and taking individual firms separately, say the textile weaving - at 1.8 optimum shift coefficient employment creation expands by 100 per cent. And the tanneries and oil-seed processing using, the same 1.8 desirable shift coefficient, there is an employment creation opportunity expansion by 80 per cent.

The optimum shift coefficient as a target is only the first step of analysis of employment creation potential. The next step requires further analysis of policy measures and programmes aim at reaching a higher shift coefficient.

## 10.5 Conclusions - break or minimise the vicious circle of input supply shortages

Sudan has the natural resources endowment to support industrial development of a number of products including vegetable oils, textiles, sugar, leather, and flour products. Practical constraints limit the viability of such industries at this time, however, and have led to industrial stagnation, an investment slow down and increasing capacity under-utilisation. In fact, the actual average capacity utilisation of the surveyed agro-industries is 27 per cent. The causes for the low rate of capacity utilisation are supply input shortages, these include,power

transport, material inputs and skilled labour shortages.

In the Sudan under-utilisation of capacity is not due to the lack of demand; there generally does not seem to be substantial installed capacity in excess of domestic demand. In fact, there are substantial imports of most products also produced locally. Hence, the important point is, in the Sudan, the root cause of low capacity utilisation is the chronic shortage of supply inputs and not the lack of demand.

No doubt, as we saw in table 10.6 there is very much scope for signficantly increasing employment and industrial output through increased and better utilisation of exisiting capacity with very little additional investment or none at all. The key question one has to address is what can be done to break the vicious circle of shortages and constraints of supply inputs so that firms in the Sudan can start to increase the capacity utilisation of existing plants.

10.5 (i) Improve Access to imported inputs.

Shortages of raw materials is a critical constraint to import-dependent industry. However, in view of high value and scarcity of foreign exchange, it may be difficult to relieve this constraint in the short term. Scarce input should be allocated to the most economically efficient plants.

Eliminating the present subsidies to consumers of selected imported (petrol sugar, wheat), goods, would lower consumption and have the effect of releasing hard currency for productive inputs.

Paying world market prices to agricultural producers for their output would also provide an incentive for increased agricultural products, much of which can be processed by agro-industry.

10.5 (ii) Improve power supplies

Electricity cuts seriously affect capacity utilisation in industry. Private firms are trying to cope with the problem of power cuts by installing their own generating plants, which, while relatively costly, have helped them to reach much higher levels of average capacity utilisation. For high priority public enterprise plants, and where justified economically, such generating facilities have to be installed until more adequate supplies can be guaranteed from Public Electricity and Water Corporation (PEWC). The other alternative is, given the economies of scale in electricity generation, co-operative power ventures or private industrial parks could provide inexpensive and dependable electric service.

10.5 (iii) Improve Transport Facilities

Industry suffers from serious delays in receiving shipments, especially by rail. At present the Sudan Railways Corporation is in a shambles, but at present there is a serious discussion going on to improve the rail end service . Access to private trucking has been very important to private industry in overcoming transport problems; public sector firms should also be allowed to use road transport with fewer restrictions where this is financially justified.

10.5 (iv) Vocational Training

In the industrial sector, the shortage of skilled labour and management makes some such investment crucial. On-the-job training in manual skills and academic training in general scientific and engineering skills and business management techniques is urgently needed. But the problem in the Sudan, is not only to train them, but how to retain them; many skilled Sudan labourers are emigrating to the oil rich Gulf States since the middle of the 1970s.

In the Sudan, an inappropriate pay structure and system and structure of education encourages liberal arts education; and discriminates against technical skilled and semi -skilled workers. Wages and salaries are not determined directly by the market mechanism. It is obvious that the wage structure needs to be readjusted to reflect demand and reward productivity.

10..5 (v) Allow wage flexibility

Public sector firms are at a serious disadvantage vis-a-vis private plants because they are tied to civil service wage scales. Public sector plants should be allowed to pay more competitive wages and should be allowed to pay premium wages, particularly at managerial levels. Such wage incentives should be tied to productivity increases in the units managed. Both public and private sector firms have to be given more room for dismissing unproductive workers.

Footnotes to Chapter Ten

1. N. Phan-Thuy and Others: Industrial Capacity and Employment (Farmborough, Gower, 1981) p. 15.

2. G.C. Winston: "Capital Utilisation in Economic Development", Economic Journal, March, 1971, p. 27.

3. G.C. Winston: Ibid., p. 38.

4. R.R. Betancourt and C. Clague: "Multiple Shifts and the Employment Problem in Developing Countries", International Labour Review, Vol. 114, No. 2, 1974, p. 42.

5. R. Betancourt and C. Clague: Ibid., p. 43.

6. These Acts were: The Approved Enterprises Act 1956; The Organisation and Promotion of Industrial Investment Act 1967; The Development Encouragement of Industrial Investment Act 1972 and 1974 and finally The Encouragement of Investment Act 1980.

7. Editor: "Sudan: The Collapse of an African Giant", South, April, 1983, p. 12.

8. Editor: "Ethiopia and Sudan: Slow Food", Economist Vol. 295, No. 7398, 15-21 June, 1985, pp. 47-48.

9. P. Vallely: "How US Know-how has let down the Sudanese", The Times of London, 17 July, 1985, p. 31.

10. The Economist: Op. Cit., p. 48.

11. The Times of London: Op. Cit., p. 31.

12. N. Phan-Thuy and others: Industrial Capacity and Employment Promotion, Op. Cit., p. 249.

13. Ibid., p. 341.

14. The optimal number of shifts was fixed between

1.6 and 1.8 by M. Kabaj, who takes an account of physiological and social constraints. M. Kabaj: Utilisation of Industrial Capacity: Shift Work and Employment Promotion in Developing Countries, in N. Phan-Thuy and Others: Industrial Capacity and Employment Promotion, Op. Cit., p. 343.

15. M. Kabaj: Ibid., p. 344.

# CHAPTER ELEVEN

# WAGES, LABOUR TURNOVER AND RELIABILITY

## 11.1 Introduction

Chapter ten showed how supply input shortages (labour, power and foreign exchange) are one of the main causes for the low capacity utilisation of existing industries; and that how its effect is reflected in loss of output and employment. The same chapter continued with the estimation of employment creation opportunities potential with optimum shift work pattern, assuming that steps are taken to reduce or eliminate supply input shortages and to correct distortions in factor prices so that firms can increase utilisation of existing plants capacity. This chapter focuses only on one supply input shortage, labour, and identifies the cause and impact of high turnover of labour to the Sudanese labour market and also looks if there is a relationship between labour turnover and wages of unskilled labour in the industrial sector of the Sudan.

In chapter five emigration was established as one of the accelerating factors to high labour turnover in the Sudan. Furthermore, it is known that half of the Sudanese emigrant labour are semi-skilled and skilled. This implies that emigration is creating a sectoral imbalance due to the loss of skilled labour abroad. The important issue that we will be addressing in this chapter is, can wages be another accelerating factor to labour turn over in the industrial sector of the Sudan?

How high labour turn over in the Sudan industrial sector is seen by the following statistical information. In the Sudan, almost all of the managers of the 19 agro-industries surveyed reported labour turnover as one of the main problems they face. For example, the Haj Abdalla spinning factory in 1982 hired 3,071 labourers and 2,433 left. The International spinning factory had an initial requirement of 767 workers but in 1981 it could only employ 419. Between 1982 and 1983 the same factory hired 3,268 labourers and 2.531 left.[1] The overall yearly turn over in the two factories was above 75 percent which means that over the year above 75 percent of the workforce changed employers. Even though the example might not be representative, it shows the intensity of labour turnover in the Sudan. With an unstable and unreliable workforce, it is not difficult to see the end result expressed in decline of productivity and production, capacity under-utilisation and constraint on employment promotion.

After this introduction section 2 looks at the trends and situation of money wage levels, prices and productivity of the manufacturing sector of the Sudan. We reinforce our analysis and examination of the above three variables with data for money wages, prices and productivity relating to the same period of 1978 to 1983. A comparison and assessment of the annual average money wage increase with that of annual average price increases will be followed by a comparison of wage increases with that of annual growth rate of GDP per head. Section 3 identifies the root cause why money wage increases are

not matching the general price increases. Section 4 examines the response of labour to the money wage increase that does not match to the very high cost of living; and analyses also if there is a relationship between labour turnover and wages.

## 11.2 Establishing the Fall of Real Wages

In theory "it will be generally accepted that in an economy at the early stages of development the general level of wages will be held down by the labour surplus, average real wages will rise less than productivity, profits rise faster than wages and wages for unskilled labour in particular will be kept close to 'subsistence' level".[2] The following discussion taking empirical data of wages (unskilled labour) prices and productivity of the industrial sector of the Sudan examines whether reality is close to the theory.

Table 11.1 shows that the average annual rate of increase in money wage level of unskilled labour in the industrial sector of the Sudan was 5.1 percent over the period of 1978 to 83. The same table also indicates that average real national income has recorded a negative growth rate of -0.93 during the similar period of 1978-83. This implies that money wage levels of unskilled labour in the industrial sector rose faster than that of yearly increase of real national product per capita. This is one side of the story.

The other side of the story is that if we again look

Table 11.1 Annual Trends in Money Wage (Unskilled labour) Consumer Price Index (1970=100) and Real Growth Rate of GDP per Head in the Sudan

| | 78 | 79 | 80 | 81 | 82 | 83 | average 78-83 |
|---|---|---|---|---|---|---|---|
| 1a. Consumer Price Index 1970=100 | 294 | 386 | 485 | 603 | 758 | 989 | |
| 1b. Consumer's Price Percent (%) increase yearly | 19.5 | 31.3 | 25.6 | 24.3 | 25.7 | 30.5 | 26.15 |
| 2a. Average wage per worker (in Sudanese pounds) per month | 31.8 | 33.3 | 36.45 | 37.7 | 39.7 | 41.2 | |
| 2b. Money wage increase per year in percentage | 4.1 | 4.7 | 9.5 | 3.4 | 5.3 | 3.8 | 5.1 |
| 3. Growth rate of real GDP per head | 0.5 | -1.2 | -1.6 | 0.2 | 1.3 | -4.8 | -0.93 |

Source: Own calculation based on data collected from year book of labour statistics (1984) Department of labour and in some cases directly from agro-firms visited; IBRD: Sudan: Planning for stabilisation and change (1982) and World Bank: World Development Report (1985).

at table 11.1, we see in the Sudan the average living costs were rising at 26.5 percent per year during the same period of 1978 to 83. The comparison of yearly money wage increases of unskilled labour with the yearly general price increases relating to the same period, shows that the rise of prices was five times greater than that of money wages. This implies that if we make a comparison of wages and prices only there was an indication of falling real wages. Hence, in this section we established that real wages were falling during the years in observation. The following section identifies the main cause for the fall in real wages of unskilled labour in the industrial sector of the Sudan.

## 11.3 Cause of the Fall in Real Wages

Fall of real wages of unskilled labour is partially linked with the overall stagnation of the Sudanese economy. Tenant farmers producing cotton, main cash crop, face problems of declining profitability, a combination of falling of productivity of irrigated land results in fall in volume and aggravated also by falling commodity prices.

The industrial sector has fared badly in the recent period and overall industrial production has remained virtually stagnant. At present there is low capacity utilisation in most manufacturing establishments. Recall the discussion on capacity under utilisation in chapter ten, where factories surveyed reported that among others, they suffer from chronic input supply shortages. In fact,

the survey of 19 Sudanese agro-firms showed that (see table 10.1) the average present level of capacity utilisation based on hours of operation is 27%. This high under-capacity of existing industries results in poor returns for nation, of course, they cannot be expected to pay proper wages that match the increases in inflation.

Within this picture of overall economic stagnation there are two indices that are exhibiting great dynamism. The first is that of prices. As it is shown in table 11.1 Sudan is experiencing high general price increases, an average increase of 26.5% per year between 1978 and 1983. Other sources also estimated the rate of inflation in the Sudan in 1983 at about 39% per annum.[3] The increases in the price level have been partially influenced by the inflow of remittances (through both official and unofficial channels) from Sudan nationals working abroad.

The inflow of remittance is insignificant enough to alleviate substantially the country's foreign exchange crisis (see chapter on migration) but it causes important domestic changes. On one hand, it implies an increase in effective demand without any concomitant increase in production, hence leading to inflation. Additionally, when remittances come in the form of goods (e.g. cars, music centres, videos) and consumer durables, they imply further foreign exchange expenditures as well. On the other hand, this increase in effective demand favours export and import commerce and property deals against industry and agriculture. Manufacturing sector like textiles and tanning has remained virtually stagnant,

while others mainly property deal estate and building construction hotels and restaurants and other services face a boom situation.

The difference between these types of semi-urban and urban economic activities have a major effect on wages. Table 11.2 shows an example of wage statistics for various unskilled employment. Spinners, tanners and production workers etc, who typically work in the formal organised sector establishments do not receive wages substantially higher than those engaged in casual 'market place' works. Thus car washers, shoe-polishers, porters, cart-pullers and auctioneers and money exchange for instance may get very high incomes.

This new phenomenon of the tendency of informal and service sector incomes appearing to be higher than the formal sector incomes in the Sudan is linked to the differential behaviour of the stagnating and prospering economic activities. In manufacturing and textiles for example, labourers get relatively low pay - particularly for spinning and tanning. On the other hand, bricklayers, who are involved in the booming construction industry, get relatively more. Likewise services in general and petty trading are prospering, which explains the high remuneration in those areas. This new phenomenon runs contrary to what dual labour market theories suggest. They usually imply that modern capital-intensive technologies lead to stable and well-paid employment. For according to Todaro's model,[3] the informal sector is the least paid sector where the prospective migrant stays until he secures a highly

Table 11.2 Wages rates for selected semi-skilled and unskilled occupations in semi-urban and urban Sudan

| Formal sector | Annual Wage Rates | | |
|---|---|---|---|
| | Mean | Max. | Min. |
| Production worker | 1045 | 4584 | 280 |
| Spinner | 905 | 1590 | 336 |
| Tanner | 1100 | 1440 | 864 |
| Bricklayer | 1310 | 3840 | 288 |
| **Informal sector** | | | |
| Car-washer | 1343 | 3600 | 500 |
| Shoe-polisher | 1439 | 2920 | 400 |
| **Service sector** | | | |
| Porter | 1260 | 2160 | 1080 |
| Messenger | 1074 | 2700 | 480 |
| Laundry | 2145 | 2160 | 2130 |
| Money exchange | 2750 | 3500 | 1550 |

Source: urban (semi-urban) market survey 1982.

paid job in the formal modern sector.

In a general sense, manufacturing industry in the Sudan is either stagnant or declining, and faces numerous problems of rising costs from others (eg - input supply constraints - see chapter 10), other than unskilled labour wages. Thus manufacturing industry may be prepared to pay only a certain amount as wages for unskilled labour and this has implied falling real wages, mainly because price inflation is rising much faster than the increase in money wages.

## 11.4 Reponse of Labour to Falling Real Wages and Investigation to See if there is any Relationship between Wages and Labour Turnover.

In the second and third sections of this chapter we established that real wages of unskilled labour is falling and gave the possible explanation for the fall in real wages in the industrial sector of the Sudan. The next move is to look at how labour responds to falling real wages. And also to see if there is a relationship between falling real wages and labour turnover. We argue that the main sources of high labour turnover in the industrial sector of the Sudan are, first, emigration of Sudanese labour to oil rich Arab countries and second increase in money wages are not matching the rise in inflation and that implicitly, is leading to the fall in real wages.

A high income difference that exists between wages earned in the Sudan and the oil rich Arab countries is

encouraging thousands of skilled and unskilled Sudanese labourers to migrate abroad. Table 11.3 shows the differentials between wages presently received in the Sudan by some sample of migrants and the prospective wages. The data refers to Saudi Arabia alone for selected migrants. If we take a mechanic as an example, his present wage in the Sudan is £Sud. 840 per year. The same mechanic's prospective wage in Saudi Arabia is £Sud. 9600.

Table 11.3 Present and Prospective Wages of Selected Sudan Migrants to Saudi Arabia (£Sud per year)

| Present occupation in the Sudan | Present wages in the Sudan | Prospective Wages in Saudi Arabia | Differentials |
|---|---|---|---|
| Teacher | 700 | 4200 | 6 times |
| Labourer | 900 | 10800 | 12 times |
| Mechanic | 840 | 9600 | 11 times |
| Driver | 480 | 4440 | 9 times |
| Doctor | 1200 | 10800 | 9 times |

Source: Urban Labour Market Survey 1982.

The wage differential is very wide for most jobs often being as much as 10 times the existing salary in the Sudan. The implications of this are not good news for the Sudan, as it is difficult to see how employers in Sudan can possibly compete with the much higher rates of remuneration

available elsewhere. Sudanese workers also have, relatively, an easier access to the labour market of oil rich Arab countries. This reflects not only the close cultural and religious links between the Sudan and other Gulf states but also geographical proximity and ease of entry.

What about the response of workers who for one reason or another did not migrate? The annual increase in money wages is insiginificant in comparison with the high rise in inflation, annually. Hence, the falling real wages are simply not sufficient for independent economic existence and workers respond by moving from job to job in the hope of securing more income. This labour turnover is not related to agricultural seasonality, but rather, this nature of labour turnover seems to be a form of 'semi-urban or urban nomadism', with workers going from employer to employer with the urban area as part of their survival strategy. Many others maintain their original work but search for subsidiary occupations. The high rates of absenteeism described for private and public sector (an average of 20-35% per day absenteeism reported) and as well as a government office may be related to workers' strategy of survival; that of the growing reliance of many urban and semi-urban workers on subsidiary occupations to supplement their income. Most often these occuptions are informal sector activities and may range from money exchange, petty trading, porterage or carting in the market. Thus, the distinction between formal and informal sectors becomes even more fluid, as labour moves from one to the other and may simultaneously have occupations in both.

Let us now look at the composition of labour turnover in the Sudan. From the survey of the 19 Sudanese agro-firms carried out in 1984 it is gathered that labour turnover of skilled labour was between 25 and 45 percent on average, and that of unskilled labour ranged from 35 to 60 percent. This means that in the Sudan skilled labour turnover is lower than that of unskilled. From Schmitz[4] study in Brazil, it is shown that labour turnover is lower in skilled labour ranging from 10 to 15 percent and higher in unskilled labour, ranging from 35 to 50 percent. In a rough comparison of skilled labour turnover, in both these countries, we find that it is much higher in the Sudan than it is in Brazil. One possible explanation of higher skilled labour turnover in the Sudan is the impact of emigration to oil rich Arab countries.

Schmitz, in his study of cotton spinning and weaving industry in Brazil made also an examination of two multi-national firms' labour turnover problems. Firm 'A' has by far the lowest turnover as a direct result of paying relatively high wages and having established a labour market internal to the plant. The other multi-national firm 'B' has the highest turnover rates, even though it has a recruitment and training policy similar to firm 'A', but its wages are low; which could be the main reason for its high turnover which amounts to an annual turnover of almost 50 percent.[5] There are of course few cases in the Sudan where firms who pay higher wages do not have relatively high labour turnover rates and are able to secure a stable workforce.[6]

Our contention is that the fall of the real wage and emigration are the main causes for high labour turnover in the Sudan; and that is where we find the relationship between wages and labour turnover. One contributary factor to high labour turnover in the industrial sector of the Sudan is that price inflation rise outpacing money wage increases, leading to falling real wages. The more profitable is a firm, the greater is its capacity to pay.[7] But in the case of the Sudan, the industrial sector, because of the problems mentioned earlier, (see section 3 of this chapter) remained stagnant. Most of the firms instead of profit they are making losses. Hence, under this circumstance, we cannot expect them to pay money wage increases that match the rise in price inflation. The argument here is whatever the causes[8] of increases in inflation and the rate of inflation reached 45 percent in 1985, the solution partly lies in some kind of price control. For instance, the rate of inflation can reduce significantly by tight government control over domestic credit, and restraint on recurrent budget expenditure.

Emigration is also another cause for high turnover in the Sudan. It is a bit difficult to blame those who are leaving their jobs and are migrating to the Gulf states, because once they secure a job the income they get is highly tempting. On the other hand, there is no way most Sudanese employers can effectively compete with their counterpart employers say in Saudi Arabia. The end result for the Sudan, is chronic shortage of skilled labour which is developing into sectoral imbalance due to

the loss of skilled labour abroad.

Footnotes to Chapter Eleven

1. ILO/UNHCR: Labour Markets in the Sudan (Geneva, ILO, 1985) p. 154.

2. H.A. Turner: Wage Trends, Wage Policies and Collective Bargaining: The Problems for Under Developed Countries (Cambridge, Cambridge University Press 1966) p.11.

3. M.P. Todaro: "A Model of Labour Migration and Urban Unemployment in Less Developed Countries", American Economic Review, Vol. 59, no. 1, 1969.

4. H. Schmitz: Technology and Employment Practices in Developing Countries (London, Croom Helm, 1985) p. 72.

6. ILO/UNHCR: Labour Markets in the Sudan, Op. Cit., p. 115.

7. H.A. Turner: Wage Trends, Wage Policies and Collective Bargaining: The Problems for Underdeveloped Countries, Op. Cit., p. 149.

8. In the Sudan rise in price inflation is mainly caused by reduction in official subsidies on many food items and fuel, devaluation of the Sudanese pound vis-a-vis the dollar the latest one in 1985 and domestic credit fuelled by increased borrowing by the government.

# CHAPTER TWELVE

# MORE REFLECTIONS ON EMPIRICAL EVIDENCE AND EMPLOYMENT CREATION

## 12.1 Introduction

In chapter six after analysing settlement with the experience of Eritrean refugees a proposal was made for state sponsored settlement of Sudanese migrant labour as one of employment creation strategy. In chapters seven to ten problems of capacity utilisation and alternative shift work patterns are taken into consideration along with searching for appropriate technology in order to promote more employment creation. Furthermore, in chapter eleven we saw how emigration and falling real wages are causing a high labour turnover and unstable work force in the industrial sector of the Sudan. This chapter aims at bringing together the integrated results of the job creation exercises and gives an estimation of the magnitude of employment that could be created assuming an improvement in economic management, removal of price distortion, better choice of technique, creation of settlement schemes and optimal capacity utilisation. But in the first two sections of this chapter we will be reflecting more on the empirical evidence of our micro-economic survey.

After this introduction, section two identifies the major sources of deviation of Sudanese existing firms from

the international best practice productivity. Section three explores the reasons for variations in unit cost of production, between firms in the same industry. Section 4 analyses the causes and effects of skilled labour supply shortage, section 5 looks at subsidies and their effects on factor prices and investment. Section 6 brings together the results of job creation exercises and provides an estimation of the magnitude of job creation through various measures.

## 12.2 Identification of Major Source of Deviations of Sudanese Firms from the Best Practice Productivity

### 12.2.1 Introduction

A field work survey of 19 Sudanese agro-industries reveals that Sudan industries exhibit total factor productivity well below that of best practice. Calculation of Sudanese firms' productivity have already been done in the previous chapters. Here, the concentration is on identifying the most likely major sources of deviation of the Sudanese firms from the best practice productivity. Identification of the major sources of deviation helps us to locate where the constraint lies, and accordingly come up with an appropriate remedy. Generally, a firm's productivity may be affected by conditions determined at four separate levels; 1) Economy wide (national level industrial level, managerial capacities of the firms and task level efficiency of individual worker.[1]

### 12.2.2 The National Economy

If productivity is evaluated for a given time period such as a month, some features of the national economy will impinge on the firm; breakdown in transportation systems; failure in electricity supply and other intermittant sources of production delays will lead to fluctuations in capacity utilisation. We have discussed in detail the causes of capacity utilisation in the previous chapter, but just to mention now, 81 percent of Sudanese surveyed firms reported shortage of electricity supply as one of the main causes of capacity under-utilisation.

The entire incentive structure, from those policies affecting international trade to those determining the recipients of loans from the formal financial system exerts an important influence on the desire of firms to strive for high productivity. Sudan's investment promotion measures, such as exemption from customs duty for imported capital goods, exemption from taxes encourage more the use of capital. Additionally, comparatively favourable rate of banking loans and easier availability of long term credit all contribute to the use of more scarce capital than plentiful labourers.

### 12.2.3. The Industry

Characteristics of specific industries that affect the productivity of individual firm include the

industrial organisation of the sector. If the growth of an industry has been artificially encouraged by international trade or financial policies; its productive capacity may exceed the demand of the domestic market. If it is incapable of producing at sufficiently low cost to export it will operate at higher than necessary average cost. At the current size of individual plant in the Sudanese textile sector, excess costs are not attributable to the loss of conventional economies of scale that result from increasing intensive use of fixed facilities. Rather, the important source of scale effects in the sector is the short length of individual production runs in weaving and spinning plants. Production is at its lowest level. Capacity utilisation levels at both spinning and weaving plants are only 20 to 30 percent of the intended capacity. And they work on a one shift basis.

Also, with high rates of effective protection, entry may continue to proceed in an industry and both new and existing firms may find themselves with excess capacity. Logically one would have thought of attempting to reduce the constraints that come from input supply shortages so that plants could increase utilisation capacity levels. Instead, what we see, at present, in the Sudan is the construction in progress of new textile firms; licenses have been awarded to 24 new additional spinning and weaving plants.

Also we have a case of industry (tanneries) affected

by crucial artificial shortages of materials. The fact is that there is more than enough supply of leather raw materials in the Sudan to satisfy the demand of the three tanneries. The problem is that the wholesalers of leather raw material prefer to export it in its raw state, most probably at a higher price and probably with a higher return in terms of foreign (hard) currency which is in a very high demand in the Sudan. There is a regulation, to the effect that, priority of leather raw materials be given to the local tannery processing industries; but enforcement seems very ineffective. In addition to the haphazard and indecisive nature of the government policies and actions, the managers in these three tannery processing plants say that the wholesale exporters are very rich, powerful and influential and the hard lesson of experience is that they are always ready to put their private interest before that of society. What is even more interesting but a bit serious, is that the managers say, even if they (managers) are ready to pay the world price of the leather raw materials, the wholesale exporter frequently demands payment in hard currencies instead of the local Sudanese currencies.

12.2.4 Firm

A large numer of technical skills at the firm level affect productivity. For example, adequate blending of raw fibre at the beginning of the production process and

good humidity control in both spinning and weaving are important to the achievement of high efficiency with any set of machines. The most efficient firms are usually in command of almost all of the relevant skills. The less capable are aware of the general issues and make some attempt to achieve technical mastery of the production process.

But, at least to acquire some mastery of the technical production processes requires the proper environment, continuity and stability of the skilled and unskilled work force. In the case of the Sudan industrial sector there is a complete breakdown of continuity and stability of work force, starting from the top managers, supervisors and down to the unskilled labourers. This is first, due to emigration of thousands of skilled and unskilled Sudanese to oil rich Arab countries and secondly to high labour turnover and absenteeism of work force.

### 12.2.5 Task-level Productivity

Task level productivity will depend on workers' skill and motivation. These in turn may be affected by both incentive structure and the quality and the intensity of supervision. Scarcity of efficient and capable managers and supervisors is obvious in the Sudan's factories. And the scarcity is also highly aggravated by the emigration of thousands of skilled and experienced Sudanese to the

oil rich Arab countries, in search of higher income. Some of those who are managing and supervising the factories are of second rate. The UNIDO mission to the Sudan in 1982, after visiting and evaluating the factories, argued that some of the managers have no idea of what their duties and responsibilities should be and generally how these factories should be organised. The UNIDO mission even recommended top level training.

Generally, supervisors are supposed to instruct and show unskilled labourers the right way to operate, give them advice when they (workers) are having problems and difficulties and see to it closely that workers really follow instructions. In the Sudan's spinning and weaving factories it is suggested that factory supervisors spend about 75 percent of their working time in offices instead of being near workers and machines. As we saw it in earlier chapter, in the industrial sector of the Sudan there is high labour turnover and this has a serious effect on productivity.

Perhaps, the major lesson to be learned from the above analysis is that the difference between actual and best-practice productivity can be separated into a number of components, each of which may imply the need for different remedy.

## 12.3 Comparison of Unit Costs

Section two identified the major sources of deviation

of Sudanese firms from the best practice productivity and that could assist us to locate where the problem is and accordingly look for remedy. This section focuses on investigating the cause for unit cost of production variations between firms in the same industry. We will be making a separate examination of the five industries surveyed.

Unit cost of production, expressed in terms of Sudanese pounds, (£Sud) are Khartoum tannery (0.875), Gezira (1.600) and White Nile (1.386). This means that the unit cost of Gezira tannery is nearer twice that of Khartoum. The unit cost variation is mainly due to difference in the origin of the technique and capacity utilisation.

Khartoum tannery started production in 1961. It is a medium size plant by the standard of the other tanneries. The origin of the machines is Yugoslavia. Its production meets only domestic demand, hence there is less emphasis on quality. In time of scarcity of good quality, inferior quality of hides and skins are purchased. Khartoum tannery has many years of experience, and has experienced supervisors and maintenance workers. Even though, generally, the tannery industry has low capacity utilisation (see table 12.1) still Khartoum tannery has a higher (43%) capacity utilisation in comparison with the other two tanneries. Gezira tannery was established in 1976 by a French company to meet some of local demand but mostly

for export to France. Gezira tannery is a large sized plant. And the origin of the machines are all capital intensive from France. The plant by design, its production and market caters for export, which means it faces tough international competition.

Table 12.1 Nature of Khartoum and Gezira Tanneries that Contributed to Difference in Unit Costs

| | Khartoum Tannery | Gezira Tannery |
|---|---|---|
| Size (scale) | Large | Very Large |
| Market | Local market | Export Market |
| Capacity utilisation | 43% | 25% |
| Competition | Less | International |
| Origin of Technology | Yugoslavia + local | France |
| Labour | Local skilled | Mostly Foreign |

Source: Own format based on data from the same source as table 7.1.

The unit cost (in £Sud) of output from the three wheat milling factories are Gezira (6.88), Blue Nile (7.31), and Gezira Tenants' Union (4.08). This implies that the unit cost of the relatively more capital-intensive, the Blue Nile is about twice that of Gezira Tenants' Union.

The difference in unit costs are mainly caused by origin of technology and capacity utilisation and it is shown in table 12.2.

Table 12.2 Characteristics of Gezira Flour and Gezira Tenants' Union that Contributed to Cost Difference

| | Gezira Tenants' Union | Gezira Flour |
|---|---|---|
| Size (scale) | Medium | Large |
| Technology origin | India & Local | U.K. |
| Market | Local | Local |
| Capacity utilisation | 78% | 51% |

Source: Own computation based on data from the same source as table 9.1.

Gezira Flour Mill imported its machines from United Kingdom (U.K.). The size of the mill is large, but capacity utilisation is low. On the other hand, Gezira Tenants' Union machines are either imported from India or locally produced. The Gezira Tenants' union machines are not high quality machines but they serve the needs of tenants. The price of the equipment is half the cost of the equipment imported from U.K. or other European countries. At the same time, the Gezira Tenants' Union has a high capacity utilisation (78%) and works on a two

shift basis.

The unit cost of output, expressed in terms of £Sud, of textile spinning are Haj Abdalla (1.66), International (1.11) and Wad Medani(1.09). Obviously, the unit cost of Wad Medani is lower in comparison with the other two; and the difference in unit cost is mainly due to variations in capital-labour ratio and capacity utilisation. The capacity utilisation of the three spinning firms are Haj Abdalla (20%), Wad Medani (38%) and International spinning (44%).

The unit cost of production from the four groundnut decorticators, as expressed in terms of £Sud are Medina Arab (13.83), El Hosh (16.5), Goz Kabro (14.16) and Bagier Dec (19.98). The variations in unit costs between decorticators is mainly due to differences of technology and the seasonal nature of the work. For example, Medina Arab decorticator works an average of 95 days a year, while El Hosh is in operation 58 days a year. Generally, when the groundnut decorticators are at work capacity utilisation is high, ranging between 70 to 80 percent of the intended capacity.

There is no point in making a comparison of Sudan Textile weaving because all the plants are in a shambles. In terms of capacity utilisation the highest, Shendi, has 23%, and the lowest, Dongalla, 10%. The Government's policy is that public sector industries are established to produce those goods which the private sector cannot

produce because of high investment costs and to achieve balanced development between the various provinces in the Sudan. For instance this policy motivated siting six textile weaving plants in the remote parts of the country. These textile weaving plants were designed without reference to adequate feasibility studies and have encountered production and financial loss ever since. Their establishment and operation has perhaps furthered the goals of balanced development and dispersion of employment and income; however, they had a record of inefficiency and financial loss. Such unviable and inefficient projects survive on government subsidy, as shown in table 10.4.

In general, there are many reasons for the shortcomings of the private and public sector enterprises, poor management, inadequate internal organisation and control, contradictory and unclear objectives (in the case of public sector enterprises). In addition, there are many shortages and constraints (such as power, transport, labour, domestic and imported inputs), which affect the country as a whole and which in general led to a very low level of capacity utilisation. Capacity utilisation of most industries surveyed ranged between 20 and 40 percent, which increased the cost of production considerably and threatened a number of industries with bankruptcy. This represents a serious economic loss to the country. Moreover, many of these plants are not generating the

earnings needed to repay the loans taken out for their construction.

## 12.4 Shortage of Skilled Labour

### 12.4.1 Discourage Emigration and Open New Technical Training

In the Sudan skilled labour is in short supply mainly because training programmes are inadequate and emigration.

#### 12.4.1.1 Emigration

As we saw in the earlier chapter emigration of skilled labour to Gulf States has highly aggravated the already short supply of skilled labour. Available estimates in the Sudan indicate that between 1976/77 and 1977/78 about 16 % of the total central government administrative and professional staff emigrated without giving any formal notice.[2] A World Bank study of migration in the Middle East region in 1975 shows that the number of trained people leaving nine Arab countries to work in neighbouring oil producing countries constituted 13 percent of the home countries professional and technical manpower. If present trends continue to 1985, more than ⅔ of Sudanese professional and technical workers are likely to be employed elsewhere in the Middle East.[3] Between 1977/1978 to 1979/80, there was an estimated addition to the

stock of about 25,000 from training institutes within the Sudan. Between 1977/78 and 1979/80 about 15400 persons from this category emigrated. This number constitutes about 57 percent of the estimated addition to stock.[4] A weaving firm reported losing 25 to 29 financial accounting staff numbers to the Gulf States in the last 7 years.[5] Hence, it is no wonder that 75 percent of the surveyed agro-industrial sector in the Sudan reported shortages of skilled labour as a major supply input constraint contributing to low capacity utilisation.

As experienced and skilled workers leave Sudan, they have tended to be replaced by relatively inexperienced and less skilled labour rendering lower quality services and higher unit costs. Emigration of technical and managerial talents has also disrupted production, thus, further lowering productivity.

Calculations taking into account the losses in output and employment that may be suffered by the exporting country (in this case Sudan) as a result of its losing skilled technicians and managers would have ideally shown how serious such losses can be; but at this stage it is not possible due to statistical problems. However, the relative impact (importance of supply input shortages power , skilled labour, foreign exchange) in total mix is reflected in chronic low capacity utilisation of Sudanese industries and the economy in general.

The growth of per capita income can be broken into

three parts: 1) population growth rate 2) investment/ income ratio and 3) additional income per unit of investment. Per capita GDP in Sub-Saharan Africa grew by an average of 1.4 (Sudan 1.5) percent a year in the 1960's but this decelerated to 0.4 (Sudan 0.5) percent a year during 1970-81. Of this deceleration about half was accounted for by an increase in the population growth rate. The availability of investment as a percentage of GDP increased during the 1970's average 22 percent (Sudan 25 percent) of GDP during 1970-81. Thus, the deceleration in the GDP growth rate was probably mainly due to the failure of capital investment to generate income growth comparable to the previous decade.[6]

On the positive side remittances from Sudanese working abroad (including nil-value imports) were equivalent to 15 to 20 percent of Sudanese imports during the late seventies (see table 5.8). In fact total inflow was US $ 250 million in 1982. Yet even this contribution was not entirely positive for many of the imports under the nil-value license scheme were of non-essential commodities - procurement of expensive cars, electrical and electronic equipment such as videos and music centres - led to further foreign currency expenditures on spare parts, electricity and fuel.

12.4.1.2 Inadequacy of Training

Skilled labour supply shortages is not only caused

by emigration but also by training programmes that are inadequate and in many cases do not match the requirements of the economy. The annual output of the four vocational training centres established under the 1967 Industrial Act is very small relative to the demand for such skills as shown in table 12.3.

The government of the Sudan made an estimate of the expected shortages in skilled and professional manpower during the period of six year plan. This is in table 12.4 and shows that between 1978 and 1983 development projects and other activities were expected to face a shortage of over 21,000 such people. But even this number must be considered a gross underestimate as it was made before the great increase in number of skilled labour emigrating and does not include the impact of such movement.

The system of education and training has also a major role to play in these shortages. Government recruitment policies, has operated to make liberal arts education much more attractive in terms of job prospects than technical training. In spite of recent efforts to alter it, the higher level education system remained heavily biased in favour of producing arts graduates with no particular technical skills. Furthermore, the preference for university education rather than vocational training is still widespread, so that the universities continue to produce relatively large numbers of graduates, while crucial and necessary technical skills are not developed.

Table 12.3 Total output of vocational training in Sudan by Craft (Skilled Labour) 1976/77-1981-82

| Year | General fitting | Diesel and benzine mechanics | General electricity | Plumbing | Building drawing | Carpentry | Automobile and Mechanic electricity | Gas and electrical welding |
|---|---|---|---|---|---|---|---|---|
| 1976/77 | 30 | 12 | 10 | 8 | | 8 | 4 | 4 |
| 1977/78 | 68 | 65 | 25 | 12 | 11 | 14 | 6 | 4 |
| 1978/79 | 72 | 71 | 33 | 12 | 3 | 5 | 6 | 3 |
| 1979/80 | 65 | 72 | 24 | 11 | 5 | 7 | 8 | 3 |
| 1980/81 | 67 | 84 | 46 | 15 | 6 | 9 | 8 | 14 |
| 1981/82 | 84 | 101 | 20 | 17 | 8 | 13 | 13 | 17 |
| Total | 386 | 405 | 158 | 75 | 33 | 56 | 45 | 45 |

Source: Own compilation from data collected from Annual Reports of Labour Department, Ministry of Public Service and Administrative Reform (Sudan) 1984.

Table 12.4 Shortages of professional and skilled manpower officially estimated for 1977-78 to 1982-83 by Government

| | |
|---|---|
| **Professionals:** | |
| Agriculturalists | 2,340 |
| Veterinary Doctors | 1,200 |
| Engineers | 2,160 |
| Total | 5,700 |
| **Technicians:** | |
| Agriculture and forestry | 2,850 |
| Veterinary | 1,420 |
| Medical Assistants | 1,030 |
| Mechanical and Electrical | 1,920 |
| Technical and Construction | 1,650 |
| Total | 9,870 |
| **Assistant Technicians:** | |
| Agriculature, Forestry and Veterinary | 2,200 |
| Mechanics and Chemists | 1,100 |
| Construction | 2,100 |
| Total | 5,730 |
| Grand Total | 21,300 |

Source: Sudan Country Presentation to the UNDP Conference on LDCs, Paris, UN 1981.

Table 12.5 shows the graduates of the various universities for the two years 1980/81 and 1981/82. Nearly two thirds of the 8138 graduates had studied arts, social sciences, education or law.

12.4.1.3 More Technical Training

We saw in earlier sections that output of skilled labour falls short of the demand and that the already shortage of skilled labour supply is highly aggravated by emigration. And since in the Sudan emigration is caused by the pull of higher incomes and the right of every muslim to visit the islamic holy places (Saudi Arabia) direct control of emigration would be difficult if not impossible. There are some options and I have analysed them in my concluding chapter, but here, the focus will be on the optimum use of the already existing technical training institutes and the establishment of the new (technical institutes) ones.

It is an inescapable fact that national technical training programmes are not adequate to supply even the domestically required skilled labour. In other words, the demand for skilled labour is greater than can be met by the existing system and resources. Obviously the government should consider increasing substantially its investment in technical education. New technical training would have to be created and the output of the existing

Table 12.5 Graduates of various universities, 1980/81 1981/82, (total for 2 years)

| | Univ. of Khartoum | Islamic Univ. of Omdurman | Univ. of Juba | Univ. of Gezira | Cairo Univ. Khartoum Branch | Khartoum Polytechnic | Other Colleges and Institutes | Total |
|---|---|---|---|---|---|---|---|---|
| | | | (students) | (students) | | | | |
| Arts | 391 | 354 | -- | -- | 1,070 | 63 | 140 | 2.018 |
| Social sciences, Education and law | 711 | 129 | 408 | 50 | 1,516 | 204 | 22 | 3,040 |
| Agriculture | 403 | -- | -- | 66 | -- | 234 | 307 (students) | 1,010 |
| Science | 217 | -- | -- | 39 | 12 | -- | -- | 168 |
| Engineering ) Medicine ) Parmacology ) Veterinary ) Architecture, etc.) | 1,057 | -- | 19 | 47 | -- | 451 | 228 | 1,802 |
| Total | 2,779 | 483 | 427 | 202 | 2,598 | 952 | 697 | 8.138 |

Source: Statistical Abstract of Sudan, 1984, p. 37-49.

one be increased. Given the overall constraints on investment funds, this may have to be at the cost of further reduction in other areas of less immediate relevance. The universities continue to produce too many graduates in the humanities and too few in the technical areas required by the economy. What the government can do is, at least, change drastically the ratio of arts based disciplines to those on science and technology.

The shortage of skilled labour supply has been made worse by emigration to the Gulf States of trained technicians graduating from the few technical institutes in the country. Thus, with almost half of the present flow of migrants either skilled or semi-skilled, Sudan is faced with the task of training labour, not only for Sudan but skilled labour for the Gulf States as well. The government should therefore take steps to reduce this cost by asking the recipient countries to increase the aid specifically earmarked for education. The adverse labour impact of continuous drain of skilled manpower might also be eased by forcing more effectively the policy of requiring those whose training has been fully subsidized by the government to serve in the country for a period of years before permission to emigrate is granted.

The cost of education in Sudan is made a more serious issue by the fact that many students, after having been trained largely at government expense, leave the country

to work abroad. Sudan does not capture the benefits of the increased labour productivity arising from its expenditures on education of those who emigrate, except to a limited extent through workers remittances. This would indicate the desirability of finding other methods of cost recovery in education such as charging special fees for permits to work abroad and to renew passports to remain abroad.

## 12.5 Government Industrial Policies

This section makes an analysis of the Sudanese government industrial incentives and policies and also assesses their effects, particularly on factor prices.

### 12.5.1 Government Subsidies

Exports like cotton, meat and livestock were taxed and subjected to unfavourable exchange rates and such action obviously reduces their competitiveness on World markets; but imported sugar, petrol and wheat are heavily subsidised (see table 10.4). Similarly, as we examined in the previous section of this chapter Sudanese Agro-firms, in general, and the Textile Weaving in particular, instead of yielding surpluses, several of these enterprises rely on government for subsidies and is also shown in table 10.4. If we

compare the total revenue and subsidies of 1980/81, we find that total revenue was £ Sud 738 million, and total subsidies were £ Sud 72 million. This means that a proportion of 9.9 percent of the total revenue represents subsidies.

Instead of taxing export crops through export taxes and unfavourable exchange rates and using the proceeds to subsidise urban living, the government could maintain a realistic exchange rate and secure reasonable price to the farmers. At the same time, removal of subsidies for petroleum products, sugar and wheat should reduce growth in consumption and have the effect of releasing hard currency for productive inputs.

### 12.5.2 Government Capital Subsidies

Imported plant machinery, equipment and spare parts are either exempt from duty or carry a relatively low rate of duty. Such imports also qualify for preferential tax treatment under the Encouragement of Investment Act of 1980. The loss of import duty from concessional treatment of development import amounts to £ Sud. 29 million in 1979/80, according to the Ministry of Finance data.[7] In view of the heavy cost to the treasury a review of these tax concessions is suggested, especially in light of the fact that other factors such as realistic, stable exchange rate and

adequate infrastructure are far more important than tax concessions in encouraging investment.

The question might arise, how would elimination of duty free capital imports improve under utilisation of capacity in the Sudan? As we examined in previous paragraphs, the prices of certain inputs fails to reflect the supply situation of those items; for a variety of reasons the factor prices are distorted. Over valued exchange rates, subsidised interest rates and generous investment allowances, by lowering the price of capital, artificially cheapen imports and thus stimulate the purchase of foreign equipment. In fact, the lowering of the price of capital decreases the capital share and makes new investments more profitable, while by increasing the ratio of the cost of shift work to the cost of single shifting, it reduces the profitability of shift work. It is this that encourages entrepreneurs to make new investments rather than to employ an additional shift in an existing under utilised plant. On the other hand, if we assume that capital and labour reflect their relative scarcity; and also if we take the basic assumption that labour in (LDCs) Sudan is plentiful (and presumably cheap) whereas capital is scarce (and presumably dear) then it would be for the advantage of entrepreneurs to utilise fully the existing capacity rather than to invest in new factories.

### 12.5.3 Government Labour Related Policy

The Sudan government labour policy, enacted a minimum wage law and assured permanent employment after 60 days with the firm. The inability of the firm to dismiss or penalise workers for absenteeism or low productivity after the initial 60 days has brought about a lax attitude on the part of the employees. Also, with frequent work stoppages owing to shortages of other inputs, the firm's wage bill is often their dominant fixed expense. There is the suggestion that Sudanese government labour policy needs to allow greater flexibility to employers in hiring practices, room for dismissing unproductive workers and most important the contention is that wage incentives have to be tied to productivity.

## 12.6 Possibility of Employment Creation

### 12.6.1 Introduction

This section brings together the integrated results of the job creation exercises and provides an estimation of the magnitude of employment creation. The attempt on job creation has, of course, to be tried on a very unfavourable Sudanese economic environment. As we mentioned in earlier chapters the

major problems of the Sudan at present are: a shattered economy, a suffocating debt burden and civil unrest in the South. Budget deficit was running at 23% of GDP in 1985, inflation reached 45% in 1985, debt service reached £ Sud. 980 million in 1985, and the rate of population increase is about 2.8 % per year. These problems are compounded by further falls in world prices for Sudan's main export - cotton. Major and coherent policy initiatives are needed to deal with Sudan's economic problems.

To come back to the main issue that interests us here, major objective must be to step up the rate of growth of industrial production itself. Some of the policies designed to stimulate industry in general are considered later. But in addition to general stimuli, it is necessary to examine what can be done to augment the volume of employment within the industrial sector at any particular moment. There are two areas which merit consideration; the present under-utilisation of equipment and the choice of more or less labour-intensive techniques of production. Furthermore, employment generation with the creation of settlement schemes is also considered.

### 12.6.2 Fuller Utilisation of Installed Capacity

Reference has already been made in chapter ten to

the under-utilisation of productive equipment in the industrial sector of the Sudan. For instance the 19 Sudanese agro-firms surveyed were operating at 27 percent of capacity. Obviously, such a state of affairs has its damaging consequences for economic growth and for employment.

There is very much scope for significantly increasing employment and industrial output through increased and better utilisation of existing industrial capacity in the Sudan; if we assume that supply input shortages and distortions of factor of production are either eliminated or minimised. Then, using the 1.8 optimum shift coefficient[8] on average, employment creation and production expand by 70 percent for the 19 agro-firms surveyed. Hence, with optimal capacity utilisation we can have an additional employment creation of 5315.

### 12.6.3 Choice of Production Techniques

In ealier chapters 7 to 9 the technologies technical and economic efficiency of five Sudanese agro-industries were evaluated. Examination of technology employed by 19 Sudan agro-firms demonstrates first, the existence of choice of technology, second that the technique actually used in the Sudan could have been replaced by more labour -intensive

technology and third, results also show variations in (unit production costs, capital-labour ratio and employement creation) between plants in the same industry.

Here, also there would have been a scope for augmenting employment, other things being equal, by assuming a choice was made for the relatively less capital-intensive technique instead that of the more capital intensive technique, for the firms in the same industry. For instance, the relatively labour-intensive Khartoum tannery provides 5 times higher employment per unit of investment in comaparison with Gezira tannery. Hence, in this case a choice of Khartoum tannery would have been made rather than Gezira tannery. And so on with other remaining agro-firms surveyed. With such kind of exercise 4067 new jobs would have been created.

### 12.6.4 Creation of Settlement Schemes

After examining the experience and weaknesses of organised settlement of Eritrean refugees in eastern Sudan, and reinforced with the assessment of internal migration in the Sudan, creation of settlement schemes is proposed as one of the remedies to Sudan's employment problem. Reference has already been made in chapter five of the existence of high rate of internal (most

rural-rural) migration in the Sudan, and how that in spite of its serious constraints (longer distance, haphazard recruitment methods etc.) migration is still alleviating regional imbalances.

There are those who might contend that not to rush into creating settlement schemes but to increase the mobility of labour by providing adequate incentives (say minimise the constraints) for labour to seek work. Well, it is always positive to try to minimise constraints but the critical issues are the following. We assume that Sudan sticks to its core development strategy and policy, then, already major ecoomic and development activities are concentrated in the eastern and central Sudan and most probably will continue like that. Obviously central and eastern Sudan attract migrant labour mainly from western Sudan. In fact, above 55 percent of all migrants come from Darfur and Kordofan (western Sudan) a distance of more than 1,000 kilometres. This simply means that the demand for labour is in eastern and central Sudan and the supply of labour is mainly western Sudan.

Second, originally, the tenants' family in addition to supplying family labour had the role of recruiting above 50 percent of migrant labour. But recently their role in recruiting migrant labour is diminishing due to their developing off-farm economic interests. This means even the unreliable and loose

link is about to be broken with all its unpleasant consequences; firstly the jobs of thousands and thousands of migrant labourers would be in jeopardy and secondly production of cash crops would drastically fall. Thirdly services of basic infrastructure, (clean water, basic health etc.) would be efficient and effective in settlement schemes, and mind you, most basic infrastructure services are also located in east and central Sudan. Well, the proposal here is the possibility of gradually bringing labour closer to capital and improved land through the creation of settlement schemes for Sudanese migrant labour.

Many labourers who come from western part of the Sudan may like to settle down in other areas where there are better prospects of continued employment. A scheme of incentives for such voluntary organised settlement of rural population may be worked out. It may include financial assistance for the transfer of residence, construction of accommodation at new locations and the provision of residential and agricultural land.

Some persons might suggest for a very large scale of settlement programme. But here, the suggestion is for the gradual creation of medium sized settlement schemes, because, first one has to consider the cost that is going to be incurred in organising settlement, second, the need to learn from the experience and

weaknesses of Eritrean settlement (for instance, most settlements are just too small for basic services - such as water, health - to be provided at a reasonable cost, but also if we take Gedaref - size is not in proportion to the available infrastructure resulting in pressure on the limited facilities which leads to their deterioration). Third, one has also to take into consideration the time (5-7 years) to settle 120,000 Eritreans, and fourth, at the initial stage it is a learning period. Hence, the suggestion here is for the establishment of initialy, three medium sized (15,000 - 20,000 population size) settlements. Assuming that the proposal is put into practice then initially around 55,000 new jobs could be created within 2 - 3 years through the creation of settlement schemes.

12.65 Investment Policies and Employment

In previous section the discussion focussed on the employment that could be created and on the output that could be expanded with the fuller utilisation of existing productive industrial capacity and with the use of less capital-intensive techniques in the 19 Sudanese agro-firms surveyed. In other words, the emphasis was on what can be done to increase employment within the industrial sector at any particular moment. Furthermore, with the proposal of settlement as

employment creation strategy, the number of persons that could be productively employed with the initial implementation of the programme of settlement was approximated. But the overall objective has to be finding ways and means of stimulating industry to create more jobs and to ensure per capita growth. And, hence, in this section we will be examining some policies designed to stimulate industry in general in the Sudan.

Reference has already been made of the stagnating and deteriorating current economic situation of the Sudan; with a budget deficit of 25% GDP in 1985, debt of £ Sud. 10 billion, inflation reaching 45% in 1985, inappropriate choice of techniques and chronic under utilisation of existing industrial capacity. This bleak current economic situation of the Sudan is partly (directly and indirectly) the by-product of 25 years of Sudanese industrial development strategy based on import-substitution incentives. Under the present economic circumstances there cannot be a conflict to the necessity of some kind of reform programme essential for Sudanese economic survival and for stopping the deterioration of the economy. Obviously, reform programme requires funds, but quite frankly there is not a lot that can be done with the current economic condition to mobilise domestic savings. In this case, we assume the securing of concessional external

assistance is feasible. Once external funds are secured, then equally important is also the use to which such funds are put.

In the short run Sudan's reform programme should aim at the removal of shortages and the reduction of budget deficit. With the removal of supply input shortages capacity utilisation of existing industries should be increased. And with the elimination of subsidies (to inefficient plants and imports of petrol, wheat etc.,) and import control of non-essential goods the problem with the budget deficit could be reduced.

Governments do seek to orient that part of savings which is available for investment by specifying certain industries, where in new investment will enjoy fiscal benefits, generally those industries which can contribute to import substitution (e.g. for the last 25 years the Sudanese government has done quite a lot to stimulate industry through import-substitution incentives) or to export expansion. For the medium and long run quite a different (from that of the past strategies) of economic strategies and policies is recommended for the Sudan. The proposal is to orient investment to labour- intensive branches of industry or within an industry, to firms utilising labour-intensive techniques. These objectives may be furthered by the use of one or more of the following three policy instruments; discrimination in lending policy, fiscal

concessions and/or subsidies.

Regarding lending policy the Sudan government needs to establish credit agencies (special banks) for the purpose of channelling investment funds to firms which produce agro-industrial products and small scale enterprises in general where there is a presumption of labour intensity. Not only does this give such firms preferential access to the capital market, but frequently the interest rate and other conditions are geared to be more favourable to the smaller than to the larger firms.

Fiscal measures can also be used in various ways to stimulate employment. Fiscal policy can be used to influence the use of capital-intensive equipment. This may be done first by general measures to make use of equipment less attractive for the producer, relative to that of labour or second by selective measures to make the use of capital-intensive equipment less attractive to that of labour-intensive equipment. These changes may be secured either by taxes or subsidies approach. For instance a tax may be levied on the import of equipment which could be produced locally.

The crucial point of the preceding analysis is that there is a scope, without in any way prejudicing the over-all objectives of economic growth, for using the partial control over investment resources and the total control over fiscal measures which the Sudan

government possess to orient new firms and the expansion of existing firms towards employment promotion.

Let us build a simplified arithmetical model of the basic elements of employment strategy of the Sudan for the coming decade (1985/95) with the assumption that Sudan will be following the economic strategies and policies previously recommended.

A convenient point of departure might be to set up a model of the evolution of the supply of and demand for labour in the Sudan, for say, a decade ahead. Sudan has a labour force growing at 3 percent per annum, and having at present an occupation distribution of 78 percent in agriculture, 10 % in industry and 12 % in service sector. Making allownace for a migration from agriculture, the non-agricultural labour force might be expected to grow at 4.6 % and the agricultural at 1.5 % per annum. By the end of the decade each 22 non-agricultural persons would have become 32 and each 78 farm persons 90. This would imply the creation of 12 additional jobs in agriculture for every 10 additional jobs in the other sectors, apart from any attempt to reduce the volume of unemployment.

Since the thesis is concerned with industrial sector employment let us consider the manufacturing industry. The first step is to determine how the projected increase of 4.6 % per annum, made up in

part of natural increase and in part of exodus out of farming, might be absorbed. In the manufacturing sector the recent experience of developing countries has been that a 2 percent rate of increase in output has been associated with a 1 percent rate of increase in employment;[9] in other words for employment to expand by 4.6 percent per annum output would have to expand by 9.2 percent. Even though in the late 70s and early 80s production and productivity was declining, still the average annual growth of the manufacturing output of the Sudan (1970-82) was 6 percent. Assuming that Sudan learns from its past experience and weaknesses, uses its available resources more constructively and wisely and more important, stimulates the use of labour-intensive techniques in the years ahead, one might hope for an increase of manufacturing output of 8 to 9 percent and that might yield a 5 percent annual increase in industrial employment.

## 12.7 Summary and Conclusion

Chapter twelve comprised two parts; it reflected more on the empirical evidence of our micro-economic survey and it brought together the integrated results of the job creation exercises. This chapter identified the causes of deviation of Sudanese firms from the best practice productivity. The main lesson to be

gained from such kind of analysis is that the difference between actual and best-practice productivity can be separated into a number of components (economy wide, industry - level, firm-level and task-level) each of which may imply the need for different remedy. Furthermore, this chapter investigated the causes of unit cost of production variations between firms in the same industry, and made a separate examination of each of the five industries surveyed. It was found out that the difference in unit production costs were mainly caused by variation in the origin of technology and capacity utilisation.

The existence and the causes (inadequate training, and emigration) of shortage of skilled labour supply are also analysed in this chapter. The national technical training programmes are inadequate to supply even the domestically required skilled labour, and in many cases they do not match the requirements of the economy. The focus has to be on the optimum use of the already existing technical training institutes and the establishment of the new ones. The already shortage of skilled labour is also highly aggravated by emigration. This means that Sudan is faced with the task of training labour not only for itself but also skilled labour for the Gulf States. The government should therefore take steps to reduce this cost by asking the recipient countries to increase the aid specifically earmarked

for education.

This chapter also made an analysis of the Sudanese government incentives (subsidies) and their effects on factor prices and investment. We saw that subsidies (among others) by lowering the price of capital artificially cheapens imports and thus stimulates the purchase of foreign equipment. Such kind of policy incentives had the effect of encouraging the choice of capital-intensive technique and assisting entrepreneurs to make new investments rather than to employ an additional shift in an existing under-utilised plant.

The second part of this chapter brought together the integrated results of the employment creation exercises and provided an estimation of the magnitude of job creation. In the short run, it is necessary to examine what can be done to increase employment within the existing industrial sector at any particular moment. We considered the present under-utilisation of capacity and the choice of more or less labour-intensive techniques of production.

The contention here is that there is very much scope for significantly increasing employment and industrial output through fuller utilisation of existing industrial capacity, if supply input shortages and factor price distortions are either reduced or eliminated. In fact, with the optimal capacity utilisation of the 19 Sudanese agro-firms surveyed, we

estimated an additional employment creation of 5315. Similiarly, it was argued that there would have been a scope for augmenting employment by assuming that a choice was made for the relatively less capital-intensive technique instead that of the more capital-intensive technique of firms within the same industry. And with such kind of exercise 4067 new jobs would have been created in the 19 Sudanese agro-firms surveyed.

The creation of medium sized settlement schemes is also proposed as one of the remedies to Sudan's employment problem. Taking into consideration the cost involved, the time required, being a learning period and experience and weaknesses of past settlement schemes within and outside Sudan, the suggestion here is for the establishment of initially three medium sized (15,000-20,000 population size) settlements. Supposing that the proposal becomes real then, initially around 55,000 new jobs could be created within 2 to 3 years.

It was also suggested in this chapter that for the medium and long term the major objective has to be finding ways of stimulating industry to increase its output and create more jobs. In this case we are interested in the rate of job creation relative to the rate of growth of supply of labour. It was proposed that the above objective could be realised by the orientation of investment towards labour-intensive

branches of industry or within an industry to firms utilising labour-intensive techniques. Suppose that Sudan follows the above suggested industrial strategies and policies, in the coming decade, then manufacturing output growth of 8 to 9 percent per annum is feasible. Assuming that manufacturing output target is achieved then 4 to 5 percent increase in the demand for labour annually is also feasible. This implies that job absorption (creation) more or less, matching the growth of labour supply in the urban areas of the Sudan.

Footnotes to Chapter Twelve

1. H. Pack: "Productivity and Technical Choice: Applications to the Textile Industry", Journal of Development Economics, Vol. 16, Nos 1-2, 1984, pp. 153-176.

2. ILO/UNHCR: Labour Markets in the Sudan, Op. Cit., p. 165.

3. World Bank: World Development Report (Oxford, Oxford University Press, 1983) p. 103.

4. IBRD: Sudan: Planning for Stabilisation and Change (Washington D.C., 1982) p. 95.

5. A figure given to the author by the manager of the Kadugli weaving factory.

6. World Bank: Toward Sustained Development in Sub-Saharan Africa (Washington D.C., 1984) p. 25.

7. IBRD: Sudan: Planning for Stabilisation and Change, Op. Cit., p. 49.

8. For clarification see footnote to chapter ten, number 14.

9. United Nations, Centre for Development Planning: Employment Policies of Developing Countries (New York, 1972) p. 48.

# CHAPTER THIRTEEN

# CONCLUSION

This thesis is concerned with the possibility of employment creation in the agro-related industries and through creation of settlement schemes in the Sudan.

Chapter one provides the introduction to the thesis. Chapter two gives the main reasons for employment creation and identifies two approaches to employment creation. This chapter continues discussing the conceptual and analytical problems that one faces when defining and measuring employment, unemployment and underemployment in LDCs. We saw that one of the main causes for the above mentioned problem is that in many LDCs only a small percentage of labour force are engaged in wage employment and the majority are being self-employed and unpaid family labour. In other words, economic activities merge into a wider complex of family based activities. The same difficulties of estimating of unemployment and underemployment are also examined with the experience of the Sudan.

Chapter three provides a short survey of the characteristics of the Sudanese economy and shows its growth potential and weakness. The rate of economic growth slowed considerably after 1978 and, although economic performance improved in 1981 and 1982 as a result of improved output in the agricultural sector, the economy has since then deteriorated considerably with negative

growth rates being recorded in 1983 and 1984 due to declining volume and quality of agricultural output and to falling commodity prices, especially of cotton. The failure of the large-scale agricultural development plans in the 1970's and the poor returns on heavy investment in industry coincide with a rapid rise in the cost of imports, especially fuel and these factors provide the source of Sudan's current economic problems. The debt burden incurred as a result of the expenditure on upgrading primitive infrastructure and financing severe balance of payments difficulties has severely curtailed Sudan's capability for economic manoeuvre.

Chapter three also shows that Sudan's development strategy emphasised raising per capita income as the primary objective. Other objectives such as employment creation or equity are thought to be a by-product of general economic growth. This means that the focus was on the development of both modern industrial and irrigated and mechanised agricultural sector to the complete neglect of the traditional agricultural and informal sector. Employment considerations were neither seriously considered nor integrated in any planning exercises.

Chapter four provides a detailed examination of the size, age, sex structure composition, labour force participation rate and trends of the population and the labour force of the Sudan. The population of the Sudan was estimated at 20.5 million in 1983 rising at an annual

rate of 2.8 percent. About 71 percent of the population live in rural areas, 18 percent in urban and semi-urban areas and the remaining 11 percent are nomads. The 1973 census result shows that 47 percent of the population were under 15 years of age. It means that the population of the Sudan is mostly young. And this implies, firstly a high dependency ratio and secondly more new entrants to the labour market in addition to those already unemployed and underemployed persons. It is also shown in this chapter that the labour force in the Sudan is estimated at about 6 million, with an estimated growth of 2.5 percent per annum. Chapter four continued with the discussion of labour force growth and its accommodation, and shows that the labour supply continues to be pushed into the agricultural sector obviously in form of increasing underemployment level and under-utilisation of rural labour.

Chapter five analyses internal migration and emigration in the Sudan. The emphasis is on the theoretical and empirical analysis of migration and emigration, focusing on the process, the characteristics, mechanism of migration and the type, duration and pattern of migrant labour. The constraints to the movement of labour from the surplus areas to shortage areas are identified as longer distance, cost of transport, haphazard recruitment methods and falling real wages due to high cost of living. In spite of the constraints mentioned above, internal

migration is still high in the Sudan, and it is estimated at about one million labourers per year. About four-fifths of total internal migration is estimated to be within the rural sector, primarily in the form of seasonal migration for work in irrigated and rainfed mechanised schemes. In the Sudan the determining factor that influences the inter-regional migration and the demand and supply of labour is the skewed distribution of private and public investment of both capital and expertise between the modern (central and eastern Sudan) and the traditional agricultural (western) sector. This implies that the demand for labour is in eastern and central Sudan and the supply of labour is mostly from western Sudan. Thus, in this case, migration is alleviating regional imbalance through the mobility of labour from western to eastern and central Sudan.

It is also shown in chapter five that about 20 percent of internal migration is rural-urban migration mostly to Greater Khartoum and Port-Sudan. The growth in the number of population as a result of rural-urban migration has not been matched by a concomitant rise in urban industrial employment. This is partly because Sudan industrial investment has been limited and overall industrial production has remained stagnant.

Chapter five also examines emigration. Official estimates suggest about half a million of migrant Sudanese. But it is widely accepted that official estimates form

only a small proportion of the total number of migrant labour. On the positive side, emigration has helped relieve the pressures of absolute and disguised unemployment (unskilled labour) domestically. And remittances from Sudanese working abroad were equivalent to 15 percent of Sudanese imports on average during the late seventies.

On the negative side, emigration has caused a serious loss of trained manpower - leading to shortage of skilled labour - that could have made a vital contribution to Sudan's economic recovery and growth. This opinion is reinforced by the fact that more than half of Sudanese emigrants are either professionals or skilled labourers. 75 percent of the surveyed firms reported shortage of skilled labour as a major constraint contributing to under-utilisation of capacity. As skilled labour leaves Sudan, they have tended to be replaced by relatively inexperienced and less skilled labour rendering low quality services at higher unit costs. Withdrawal of technical and managerial talents has also disrupted production, thus further lowering productivity. Hence, at least in the case of the Sudan, emigration is worsening sectoral imbalance because of the loss of skilled labour to other countries.

Chapter six contains one of the original research of the thesis and examines settlement, one of the possible employment creation strategies, with the experience of organised settlement of Eritrean refugees in the eastern

and central regions of the Sudan. In spite of many weaknesses and problems that organised Eritrean settlements face, mainly related to organisation, viability and lack of mobility of refugee labour, we argued that there is a good prospect for employment creation by means of creation of settlement schemes of Sudanese migrant labour.

In this chapter we made a detailed analysis, based on original field work survey data, of demographic features of the refugees household, level of illiteracy, level of education, original occupation, average annual income and skill and employment of settled refugees. It is also indicated that due to the seasonal nature of agricultural activities and the limited opportunities for off-farm employment in the slack periods, there is high rate of underemployment among settled refugees and it amounts to 42% of the persons year of the economically active population in both the wage and land settlements.

Chapter six also focuses on one hand, on the identification of skills Eritrean refugees possess, and on the other hand, on the constraints (lack of mobility, language barrier, etc.) they face in their attempt to look for a job. We have seen that there are some skills and talents among Eritrean refugees and we contend that these skills and talents could be tapped for the benefit of both the Sudanese economy and the refugees as well; assuming that the constraints mentioned earlier are eliminated or at least reduced.

Chapter six also proposed a creation of settlement schemes for Sudanese migrant labour and the proposal is based on two main and important reasons. Firstly, the employment problem in the Sudan is the problem of imbalance between the supply of labour (mainly western Sudan) and the demand (major economic and development activities are concentrated in eastern and central Sudan). Secondly, originally, the tenants' family had the role of recruiting above 50 percent of migrant labour. But recently because of their growing lack of interest in working in the tenancies themselves, their role in recruiting migrant labour is diminishing due to their developing off-farm economic interest. If that already unreliable link is broken then jobs of thousands and thousands of migrant labour would be at risk and production of cash crops would drastically fall. Under this circumstance, the other alternative option is to bring labour closer to capital by the creation of settlement schemes.

The research into employment creation strategy continues with the presentation of the results of another original micro-economic survey conducted in 1984; that is, on the choice of technique of five agro-related industries in the Sudan and they are examined in chapters 7 to 9. As an introduction a short survey on the theoretical, conceptual and empirical discussion on the choice of technique is given and at the same time the author's approach to the question of the choice of technique is clarified, that is, to examine whether those that are actually in use for making various types of product (in

this case five agro-related industries are examined) in the Sudan are economically efficient in relation to one another. Hence, the first question we ask, on all the three chapters, on the choice of technology is whether the techniques within eaoh group are efficient in this sense. The second step in the analysis is to examine total unit costs and employment implications with the various techniques available.

Examination of technology employed by 19 Sudanese agro-firms demonstrates, first, the existence of a choice of technology, second, that the techniques actually chosen in the Sudan tend to be more capital intensive than would be expected in the Sudan conditions, third, results also show variations in unit production costs, employment creation and capital-labour ratio, between firms in the same industry.

The choice of inappropriate technology in the Sudan is partly due to distortions in factor prices. The main influence in the demand for labour is the factor proportions utilised in the process of economic growth. Sudan has failed to use as much labour as it would have done because of the development strategies it has pursued and the technologies it has adopted. Sudan has adopted an industrialisation strategy largely based on import substitution. It is generally carried out behind high protective custom barriers. It has also subsidised imports of equipment and the establishment of factories.

This strategy of industrialisation ignored the comparative advantage possessed by the Sudan, that is, unemployed and underemployed labour. On the contrary, by creating distortions in the prices of the factors of production it promoted capital-intensive technology. The result is a situation of extensive underemployment and unemployment accompanied by industrial over-equipment. However, there are also other variables (other than factor price distortions) which are contributing to inappropriate choice of technology in the Sudan. They include lack of technology information, shortage of skilled labour and managerial abilities, inappropriate selection criteria, deficient feasibility studies and easier availability of long term credit to larger firms, that is, loans are tied to fixed capital assets.

Chapter ten establishes that supply input shortages (skilled labour, power and foreign exchange) as the main causes for low capacity utilisation of existing industries in the Sudan and that the effect of these shortages are reflected in the loss of output and employment. For example, the survey of 19 Sudanese agro-firms shows that capacity utilisation rate is only 27%. The same chapter continued with the estimation of employment creation opportunities potential with optimum shift work pattern, assuming that steps are taken to reduce or eliminate supply input shortages and at correcting distortions in factor prices so that firms can increase utilisation of existing

plants capacity. For instance, using the 1.8 optimum shift coefficient on average, employment creation and production could increase by 70 percent for the 19 agro-firms surveyed.

Chapter eleven focusses on labour and identified the cause and effect of high labour turnover to the Sudanese labour market and demonstrates that there is a relationship between wage and labour turnover. It is established that the fall of real wages and emigration are the main causes for high labour turnover in the Sudan.

Our comparison of yearly monetary wage increases of unskilled labour with that of yearly general price increases relating to the same period shows that the rise of prices was five times greater than that of increases in money wages, and hence, resulting in falling real wages. Most firms in the Sudan, instead of profit, they are making losses, and thus, no one would expect them to pay proper wages.

The falling real wages are not sufficient for an independent economic existance. The labour force responds in the following manner. Some of them leave their jobs and migrate to the Gulf States, because once they secure a job the income they get is highly tempting. Others who, for one reason or another, do not migrate respond by moving from one job to another in the hope of securing more income. And many others maintain their original work but search for subsidiary occupations to supplement their incomes, and this is reflected in a very high rate of absenteeism.

Whatever the response of labour (emigration, urban-nomadism and absenteeism) is to falling real wages, the end result is remaining with unreliable and unstable labour force, and with all its effects on productivity. The remedy partly lies in how one tackles rising price inflation (the rate of inflation reached above 45% in 1985). The suggestion here, is for some kind of price control. For instance, the inflation rate could be reduced significantly by tight government control over domestic credit mainly fuelled by increasing borrowing by the government and restraint on current budget expenditure.

The study of 19 Sudanese agro-firms came with two important findings, that the techniques chosen are inappropriate and that there is under-capacity utilisation of existing industries. It is also shown that the main causes for the inappropriate technology and low capacity utilisation are supply input shortages and distortions of factor prices. Hence, at least ideally, and theoretically, appropriate technology, optimisation of capacity utilisation and alternative shift work pattern that leads to more employment creation and higher output could be achieved firstly, by attempting to eliminate or reduce supply input shortages, secondly by aiming at correcting factor prices distortion and thirdly by encouraging shift work patterns.

The potential for industrial recovery in the Sudan, is limited by shortage of foreign exchange. Ideally, foreign exchange should come from better terms of trade

in order to increase earnings from current levels of export and to provide incentives and regards for expanding to higher levels. In the short-run, one has to acknowledge the virtual impossibility of significantly increasing Sudan's export earnings. External resources are highly required but they (external resources) have to be directed less to new capacity projects and more to increasing capacity utilisation of existing industries.

Shortages of skilled labour and managerial abilities have also greatly affected the progress of the industrial sector. The proposal here is for the creation of new industrial training institutes and the output of the existing ones should be increased.

With almost half of the present flow of migrants either semi-skilled or skilled, Sudan is faced with the task of training not only workers for the domestic labour market, but labourers for the oil rich Arab Countries as well. It is possible that the government can therefore take steps to reduce these costs by asking the recipient countries to increase the aid specifically earmarked for education. The adverse labour impact of a continuous drain of skilled labour might also be mitigated by improved manpower planning and by enforcing more effectively the policy requiring those whose training has been fully subsidised by the government to serve in the country for a period of years before permission to emigrate is granted.

Given the large disparity between domestic and

emigration wage rates, and the right of every Muslim to visit the Islamic holy places, direct control of emigration would be difficult, if not impracticable. Furthermore, the data base and administration capacity required for selective control do not exist. The future growth of remittances is difficult to predict. Important factors governing their flows will be government policies concerning inflation and exchange rate. The most important reason given for the decline in the volume of remittances is that, because of uncertainty regarding the government's exchange rate policies, emigrants are increasing using other means such as the underground market to repatriate earnings. An exchange rate adjustment that removed the very wide margin between the official and free market rates would considerably improve prospects for capturing banking system remittances which now pass through the free market. Some countries have been able to increase the flow of remittances by requiring that their nationals save a portion of their earnings each year in a foreign currency account at the National Bank before having their passports renewed. Sudan might consider adopting this method. However, enforcement requires agreement with the labour recipient countries so as to ensure that work permits are withheld unless evidence of compliance is provided.

Industrial policies that have been, so far, pursued in Sudan have greatly underestimated the effect of

infrastructural constraints on manufacturing growth. There is a need for a recognition in the Sudan, that growth in manufacturing has to be preceded by substantial improvement in power and transport. The development budget for these facilities is considered to be insufficient to finance all the required improvements. This being the case, a more productive use of the limited available infrastructural facilities have to be recommended. When rationing of power is applied, industry should be given more priority than now. Also private sector participation in this field may be encouraged. Some private firms have already acquired small generators. Given the economies of scale in electricity generation, cooperative power ventures may be encouraged to provide inexpensive and dependable electric services and should be given priority access to fuel supply.

Chapter twelve, after reflecting more on the empirical evidence of the 19 agro-firms surveyed, brought together the integrated results of the employment creation exercises. And gave an estimation of jobs that could be created with the assumption of fuller utilisation of installed capacity; supposing a choice was made for the relatively less capital-intensive technique instead of the more capital-intensive technique for the firms in the same industry, through industrial and investment strategies and policies that encourage the use of more productive employment and by the creation of settlement schemes.

The thesis has been orientated towards a discussion of the practical aspects of employment proposals and policies. For example, in the short run, with the removal of Sudan's supply input shortages capacity utilisation of existing industries could be increased. Similarly, the creation of settlement schemes could bring together labour and capital. In the medium and long term the major objective has to be looking for ways and means of stimulating industry to rise its output and create more jobs. Here our concern is with the rate of job creation relative to the rate of growth of supply of labour. It was suggested that the major long run objective could be realised by the orientation of investment towards labour-intensive branches of industry or within an industry to firms utilising labour-intensive techniques.

The main thrust of the employment creation exercises is that there is a scope, without any way affecting the over-all objective of economic growth, for utilising the partial control over investment resources and the total control over fiscal measures which the Sudan government possesses to orient new firms and a more efficient utilising of existing firms towards employment promotion.

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